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QUALITY CONTROL BOARD
LOS ANGELES REGION

February 7, 1994

Mr. William Jones
Hazardous Materials Specialist II
Health Haz Mat Division
Site Mitigation Unit
Los Angeles County Fire Department
5825 Rickenbacker Road
Commerce, California 90040

Re: Addendum to the Asbestos, Residue, and Subsurface Sampling Plan
Buildings 4, 5, 6, 14, 15, 16, and the Oil Yard--ITT Burbank Site

Dear Mr. Jones:

This letter documents several planned modifications to the enclosed sampling plan. The changes are generally minor, but expected to enhance the value derived from the data acquisition and analysis effort associated with the referenced plan.

Asbestos Survey

For the asbestos sampling program identified as Task 1 in the plan, the number and location of samples described in the plan will remain the same. However, 10% of the samples collected in the field will be split and submitted to a second laboratory for analysis. In addition, laboratory quality control analyses, including filter blanks and blank spikes, will be performed. Eighteen to 20 quality control samples will be analyzed.

Surface and Residue Sampling

In addition to the analyses specified in the original surface and residue sampling plan (Task 1), approximately 10% of the wipe samples submitted for Total Recoverable Petroleum Hydrocarbons analysis will also undergo Semi-Volatile Organic Compounds (SVOCs) analysis using USEPA Method 8270. This will allow for reconnaissance evaluation of the potential presence of SVOCs in the areas sampled.

The attached *Protocol for Surface Sampling* was developed to allow evaluation of the hydrocarbon, PCB, and metals data regarding potential worker exposure during demolition and to aid in the assessment of waste classifications with potential mitigation requirements prior to disposal. Where standards for worker health and safety are not available, technically defensible

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DRAFT

ASBESTOS, RESIDUE, AND SUBSURFACE SAMPLING BUILDINGS 4, 5, 6, 14, 15, 16, AND THE OIL YARD ITT AEROSPACE CONTROLS--BURBANK, CA

Prepared by

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11290 Point East Drive
Rancho Cordova, CA

Prepared for

ITT Aerospace Controls
1200 Flower Street
Burbank, CA

August 1993

ICF KAISER ENGINEERS

standards and decision criteria will be developed based on the characteristics of the contaminant and the medium in which it occurs.

This interpretive framework for classifying hazardous waste utilizes a combination of analytical results from surface samples and the relationship to the surface area/thickness/volume of the materials to estimate milligram/kilogram concentrations of a contaminant. This approach addresses the issue of generating weight/weight values for comparison with waste classification criteria for the contaminants of concern from weight/area analytical results. The surface area thickness results of these calculations will be compared to regulatory definitions of hazardous waste as stated in Title 22 of the California Code of Regulations (CCR). Similarly, the surface sample analytical results, combined with room volumes, will be used to calculate potential employee exposure levels. These calculations will be compared with relevant permissible exposure limits in Title 8 CCR.

Since the buildings under study are occupied, appropriate health and safety procedures will be used during the investigations to safeguard building occupants and sampling personnel.

Other than the additions cited in this letter, ENVIRON will execute the Sampling Plan as formulated by ICF Kaiser Engineers. The tasks discussed in this letter represent two components of a multiphase program. Additionally, the buildings designated for evaluation are currently occupied and the sampling schedule is dependent on obtaining access to the buildings at a time and in a manner that will not disrupt ongoing operations. We anticipate that our report will be available for agency review approximately six to eight weeks from the initiation of each survey.

Please call either of the undersigned if you have any questions.

Very truly yours,

George O. Linkletter, Ph.D.
Principal

Mark A. Katchen, CIH
Manager

GOL:MAK:bjw
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Attachment

cc: Philip Kani (LAFD)
Greg Kwey (LARWQCB)
Anna Veloz (LARWQCB)
Teresa Olmsted (ITT)
ITT Distribution

Protocol for Surface Sampling
ITT Aerospace Control Site, Burbank, California
ENVIRON Project No. 04-3484M

I. BACKGROUND

ENVIRON will implement the residue/surface sampling work plan entitled *Draft Asbestos, Residue, and Subsurface Sampling, Building 4, 5, 6, 14, 15, 16 and the Oil Yard, ITT Aerospace Controls, Burbank, California* prepared by ICF Kaiser Engineers (ICF KE) in August 1993. The objectives of the work plan are: (1) to estimate potential worker exposure during upcoming building demolition activities; and (2) to obtain information for the hazardous classification of building structures and equipment. It is anticipated that approximately 200 wipe, chip, scrape, bulk, and residual debris/liquid samples will be collected within the overall areas of investigation (see Attachment A). As part of the sampling protocol, approximately 20 field quality control (QC) samples, including field blanks and field duplicates, will be collected. In addition, one trip blank will be collected for each day of volatile organic compound sampling.

The samples will be submitted to Brown and Caldwell Analytical (BCA) in Glendale, California for chemical analysis. Depending on the nature of the samples, the analyses to be performed may include total recoverable petroleum hydrocarbons (TRPHs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Title 22, California Code of Regulations (22 CCR) metals, and soil pH.

II. SAMPLING PROCEDURE

Surface samples will be taken by two methods: (1) wipe sampling and (2) bulk sampling. Wipe samples will be taken from any smooth surface that is relatively non-porous, such as aluminum siding, sheet metal, or steel beams. Wipe sampling may not be appropriate on some porous surfaces, such as wood, asphalt, concrete, wallboard, and brick, which may absorb PCBs and TRPHs. In those cases, bulk samples will be taken. Both wipe and bulk samples may be taken if it is uncertain whether a surface is porous or not.

The procedure for surface sampling and field QC have been described in Appendix B of the ICF KE work plan and is summarized below. ENVIRON will adhere to the ICF procedure during implementation of the sampling program. In order to facilitate the data gathering process, ENVIRON field personnel will use a laptop computer and enter the data directly into a Lotus 1-2-3 spreadsheet (see Attachment B). The following is a description of the field procedure to be followed by ENVIRON personnel.

A. <u>General Considerations</u>

- The buildings to be sampled at the site will be identified prior to the field sampling effort. For each building, a unique number is designated for each room to be sampled. A unique identification number is then designated for each sample, using the format provided in the spreadsheet (see Attachment B). For instance, in Building 5, Room 6, the first sample will be identified as B5-R6-01.

- All sampling activities will be completed according to ENVIRON's site-specific Health and Safety Plan. It is expected that Level D personal protection will be used, which may include Tyvek coveralls, latex undergloves, nitrile overgloves, and safety glasses. The wipe sampling is not expected to produce any dust; however, during bulk sampling, mist water will be sprayed on surfaces to prevent any dust generation.

- The residue and surface sampling will be conducted by a team of two ENVIRON field persons; asbestos sampling is not part of this task.

- Observations and pertinent measurements will be made during field activities, and the information will be entered on the first page of the spreadsheet. At each sampling location, one ENVIRON field person will make the measurements and read the results to the other person, who will enter the data into the spreadsheet. As confirmation, the person performing the data entry will read the results back to the person taking the measurements.

- The columns on the spreadsheet that are shaded should be ignored by ENVIRON field personnel - those entries will be calculated automatically or the information will be provided later. Other pertinent information will be entered in the "Remarks" column on the second page of the spreadsheet. Back up of spreadsheet data should be performed using a floppy disk approximately every hour.

- Pictures of representative sampling locations will be taken for documentation purposes, as necessary. As a rule of thumb, pictures of approximately 20% of the sampling locations will be taken. Field notes regarding which sample locations were photographed will also be taken.

- Additional samples will be taken if warranted by site observation.

- All samples will be delivered to Brown and Caldwell Analytical (BCA) located at 801 Western Avenue, Glendale, California at the end of each working day. The analyses to be performed are listed in Tables 1-7 of the ICF KE work plan. In addition, approximately 10% of the wipe samples submitted for TRPH analysis will also be analyzed for SVOCs. Chain-of-custody protocol will be followed for sample delivery. BCA contacts include Larry Lem and Jeff Erion, at (818) 247-5737.

B. **<u>Wipe Sampling</u>**

- Relatively non-porous surfaces such as aluminum siding, sheet metal, or steel beams will be subject to wipe sampling.

- Prior to conducting the wipe sampling, required personal protective clothing will be donned (see Attachment C).

- A 3-inch square Johnson and Johnson Steri gauze pad will be rolled up and inserted into a clean wide-mouth glass sample bottle with screw cap. The inside of the cap should be lined with Teflon or aluminum foil.

- 10 m*l* of hexane (pesticide grade) will be gently poured onto the pad using a measuring cylinder and the bottle is then capped. After waiting for 1 to 2 minutes for the hexane to distribute evenly on the pad, the bottle will be opened and the gauze pad will be rolled up using a gloved hand. Any excess hexane in the bottle should be poured onto the pad.

- A 100 cm^2 template (delineated by prepared cardboard) will be over the desired sampling area. Holding one side of the pad (opposite the folded edge) and using a series of horizontal traverses, the designated area inside the template will be completely wiped. Turning the pad over, and still holding the side opposite the folded edge, the same area will then be wiped with a series of vertical traverses.

- After wiping the designated area, the pad will be opened, folded over so that the two wiped sides are inside, and then rolled up. The rolled pad will be placed in a new, clean bottle and capped. The bottle will be labeled with the date and time of sampling, ENVIRON's job number, the exact sampling location, sample number, and the analyses to be completed. Samples for VOC analysis will chilled with ice and placed in an ice chest. Chain-of-custody protocol will be followed for sample delivery to BCA.

- The outer gloves used for each sampling will be disposed of and then replaced with a set of new outer gloves prior to collecting the next sample.

C. <u>Bulk Sampling</u>

- Porous surfaces such as wood, asphalt, concrete, wallboard, and brick will be subject to bulk sampling.

- Sufficient quantity (~ 100 grams) of a discrete surficial (less than 1 cm deep) sample such as a piece of wood or paving brick will be removed by a chisel, drill, hole saw, or other appropriate instrument.

- The sample will be placed in a clean glass sample bottle and capped. The inside of the cap should be lined with Teflon or aluminum foil. Each sample container will be properly labeled in the same manner as discussed for wipe sampling. All samples will be delivered to BCA under chain-of-custody protocol.

- Equipment used to take the bulk samples will be cleaned with hexane and wiped with a disposable cloth prior to the next sampling.

- The protective gloves and wipe clothes used for each sampling will be properly disposed of in a plastic bag intended for PCB and TRPH materials prior to moving to the next sampling location.

D. Quality Control Samples

- One field blank will be collected for at least 5% (or 1 in 20) of the wipe samples and at least 5% of the bulk samples.

- For wipe sample blanks, with gloved hands, the cap from a sample vial will be removed for the estimated time of normal wipe sampling (record this time) and the gauze will be allowed to air dry without applying it to any surface.

- Bulk sample blanks will be selected from a location that is expected or known to be non-contaminated.

- One duplicate will be collected for at least 5% (or 1 in 20) of the wipe samples, and at least 5% of the bulk samples.

- For each type of duplicate sample, adjacent or nearly adjacent surface areas will be selected for sampling. The duplicate samples will be clearly identified as being adjacent to one another in the Lotus 1-2-3 spreadsheet.

- Field blank and duplicate samples will not be identified as such. Instead, fictitious sample numbers will be assigned to these samples, and the samples will be submitted to the BCA along with other collected samples.

- Field blank and duplicate samples will be analyzed for the all chemical constituents (except pH) as the wipe and/or bulk samples in each QC batch of 20 or fewer samples.

- One trip blank will be collected for each day of VOC sampling. A trip blank consists of VOC-free water prepared by the BCA and is carried unopened during the sampling trip. The trip blank is submitted to BCA with the collected samples and will be analyzed for VOCs only.

- Trip blanks will be labelled by the date of collection, e.g. 011094TB.

ITT Residue and Surface Sampling Form

Sample Number	Sample Location	Sample Medium	Sample Type	Analyte	Sampled Area (cm²)	Affected Area (ft²)	Medium Area (ft²)	Medium Thickness (ft)	Affected Thickness (ft)	Medium Volume (ft³)	Medium Density (kg/ft³)	Medium Weight (kg)	Room Length (ft)	Room Width (ft)	Room Height (ft)	Room Volume (ft³)
B5-R1-01	west maintenance area	concrete floor	wipe	PCBs	100	10	500	0.3	N.A.	150	59	4009	10	10	10	1000
B6-R3-04	mold room machine shop	floor tiles	bulk	TRPH	25	5	400	0.1	0.01	40	34	616	15	15	10	2250
B6-R3-07	overhead steel beam	steel	wipe	TRPH	100	2	10	1	N.A.	10	227	1026	15	15	10	2250
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Analytical Result	Unit	Bulk Conc. (ug/kg)	Hazardous Classification Reference Concrentation	Unit	Hazardous?	Est. Demolition Worker Exposure Conc. (ug/m³)	Exposure Reference Concentration (ug/m³)	Personal Protection Level	Remarks
10	ug (/100 cm²)	N.A.	100	ug/100 cm²	No	33.18	50	D	Other lightly stained areas observed
25	ug/kg	N.A.	none	ug/kg	N.A.	125.34	100	C	none
40	ug (/100 cm²)	0.72	none	ug/kg	N.A.	11.80	100	C	none

Key to Abbreviations for EXHIBIT E-6

Material Types:

M	=	Miscellaneous Material
S	=	Surfacing Material
TSI	=	Thermal System Insulation

Plans:

Which drawings to reference for material location

A	=	Architectural Drawings
M	=	Mechanical Drawings
P	=	Plumbing Plans
E	=	Electrical Plans

Specs:

Which division used from uniform Construction Index (EXHIBIT E-7)
Numbers 6-16

EXHIBIT E-6: REPRESENTATIVE LIST OF MATERIALS LIKELY TO CONTAIN ASBESTOS

SUSPECT MATERIALS (continued)	MTRL TYPES	PLANS	SPECS
Ductwork Taping	M	M	15
Flue, Seam Taping	M	M	15
Cooling Tower, Fill	M	M	15
Cooling Tower, Baffles or Louvers	M	M	15
Valve packing	TSI	M	15
Plumbing, Piping Insulation	TSI	P	15
Plumbing, Pipe Gaskets	M	P	15
Plumbing, Equipment Insulation	TSI	P	15
Electrical Ducts (cable chases)	M	E	16
Electrical Panel Partitions	M	E	16
Electrical Cloth	M	E	16
Insulation, Wiring	M	E	16
Stage Lighting	M	E	16
Incandescent Recessed Fixtures	M	E	16
Chalkboards	M	A	10

EXHIBIT E-6: REPRESENTATIVE LIST OF MATERIALS LIKELY TO CONTAIN ASBESTOS

SUSPECT MATERIALS (continued)	MTRL TYPES	PLANS	SPECS
Laboratory Hoods	M	A	11
Laboratory Oven Gaskets	M	A	11
Laboratory Gloves	M	A	11
Laboratory Bench Tops	M	A	11
Fire Curtains	M	A	12
Elevators, Equipment Panels	M	A	14
Elevators, Brake Shoes	M	A	14
Elevators, Vinyl Asbestos Tile	M	A	14
HVAC Piping Insulation	TSI	M	15
HVAC Gaskets	TSI	M	15
Boiler Block or Wearing Surface	TSI	M	15
Breeching Insulation	TSI	M	15
Fire Damper	M	M	15
Flexible Fabric Joints (vibration dampening cloth)	M	M	15
Duct Insulation	TSI	M	15

EXHIBIT E-6: REPRESENTATIVE LIST OF MATERIALS LIKELY TO CONTAIN ASBESTOS

SUSPECT MATERIALS (continued)	MTRL TYPES	PLANS	SPECS
Putty and/or Caulk	M	A	7/9
Door Insulation	M	A	8
Flooring, Asphalt Tile	M	A	9
Flooring, Vinyl Asbestos Tile	M	A	9
Flooring, Vinyl Sheet	M	A	9
Flooring, Backing	M	A	9
Plaster, Acoustical or Decorative	S	A	9
Ceiling Tile	M	A	9
Insulation, Thermal sprayed-on	S	A	9
Blown-in Insulation	M	A	9
Insulation, Fireproofing	S	A	9
Taping Compounds	S	A	9
Paints	S	A	9
Textured Coatings	S	A	9
Packing or rope (at penetrations thru floors or walls)	M	A	9

EXHIBIT E-6: REPRESENTATIVE LIST OF MATERIALS LIKELY TO CONTAIN ASBESTOS

SUSPECT MATERIALS	MTRL TYPES	PLANS	SPECS
Cement Asbestos Insulating Panels	M	A	6
Cement Asbestos Walboard	M	A	6
Cement Asbestos Siding	M	A	6
Roofing, Asphalt Saturated Asbestos Felt	M	A	7
Roofing, Reinforced Asbestos Flashing Sheet	M	A	7
Roofing, Asbestos Base Felt	M	A	7
Roofing, Asbestos Finishing Felt	M	A	7
Roof, Paint	S	A	7
Roofing, Flashing (tar and felt)	M	A	7
Roofing, Flashing (plastic cement for sheet metal work)	M	A	7
Waterproofing, Asbestos Base Felt	M	A	7
Waterproofing, Asbestos Finishing Felt	M	A	7
Waterproofing, Flashing	M	A	7
Dampproofing	M	A	7

EXHIBIT E - 5: SPECIFICATIONS

Proprietary

". . .starting at the low edge apply one 18" wide, then over that one full 36" wide J-M [Johns-Manville] Asbestos Finishing Felt."

Non-proprietary

"Asphalt Saturated Asbestos Felt shall be 15 pound perforated complying with ASTM Designation D 250, latest edition."

Proprietary

"Insulation shall be Pyrospray Type T, by Baldwin-Ehret-Hill, Inc.; Asbestospray by Asbestospray Corporation; Sealspray by Sealtite Insulation Manufacturing Corp., Waukesha, Wisconsin; Spray Craft, Type S by Smith and Kanzler Company; or Spraydon Standard by Spraydon Research Corporation."

Non-proprietary

"Insulation shall be a quality controlled mixture of virgin asbestos fibers and mineral wool fibers blended with inorganic binders and rust inhibitors. Binder, after setting, must be unaffected by water, moisture and condensation."

DRAFT

ASBESTOS, RESIDUE, AND SUBSURFACE SAMPLING BUILDINGS 4, 5, 6, 14, 15, 16, AND THE OIL YARD ITT AEROSPACE CONTROLS--BURBANK, CA

Prepared by

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Prepared for

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August 9, 1993

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August 9, 1993

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818/509-3100

Ms. Teresa Olmsted
Manager, Environmental Projects
ITT Aerospace Controls
1200 South Flower Street
Burbank, CA 91502

Subject: **Asbestos, Residue, and Subsurface Sampling Plan for Buildings 4, 5, 6, 14, 15, 16, and the Oil Yard--ITT Burbank Site**

Dear Ms. Olmsted:

ICF Kaiser Engineers, Inc. (ICF KE) is pleased to submit this letter report outlining the scope of work for the asbestos, residue, and subsurface sampling of Buildings 4, 5, 6, 14, 15, 16, and the oil yard at the ITT Burbank site. The information contained in this report was gathered during a site survey of the above-referenced buildings by ICF KE on April 19 and 20, 1993. During this task, building materials and surface features were surveyed to identify areas which may contain potentially hazardous materials and to select sampling protocols for these areas. At the request of ITT Aerospace Controls (ITT), additional areas were identified for potential subsurface soil and soil vapor sampling, particularly where facility processes may have impacted underlying soils.

The site survey and this sampling plan constitute Stage I of the ICF KE proposal to ITT dated March 16, 1993. The performance of this sampling and analysis plan and subsequent evaluation of the results constitute Stage II of the proposal. ICF KE recommends scheduling the subsurface sampling in conjunction with the proposed vadose zone soil vapor work for Buildings 1, 2, and 3. This vadose zone work was outlined in a letter from ITT to the California Regional Water Quality Control Board (CRWQCB) dated November 30, 1992, included with this report as Appendix A.

The buildings or areas to be sampled under this plan are presently occupied by ITT manufacturing and/or administrative personnel. The site-specific Health and Safety Plan will be strictly enforced during all sampling operations to ensure the safety of ITT employees (see **Health and Safety Procedures** below).

The following tasks were completed as part of the Stage I site survey:

- Available facility drawings and documents were reviewed to obtain historical information pertaining to the use of asbestos in the building materials and other potentially hazardous materials. Preliminary AutoCAD drawings of the buildings were obtained from ITT to mark the proposed sampling locations and for use in this report. Information pertaining to the present and past use of chemicals in each of the buildings was also obtained.

- A site walk of Buildings 4, 5, 6, 14, 15, 16, and the oil yard was conducted to identify areas to be sampled for asbestos containing materials (ACMs). This survey consisted of physically inspecting the interior and exterior of the buildings for construction materials that may contain ACMs, and noting the physical integrity and friability of the suspected ACMs. Materials selected for sampling include floor and ceiling tiles, tile mastic, wallboard, miscellaneous wall and ceiling insulation, and roofing materials.

- Building materials and surface features such as tanks, sumps, pipes, pits, and trenches were also inspected to identify areas which may contain potentially hazardous residues, solids, or liquids. Sampling methodologies, such as wipe, scrape, or bulk sampling, and analytical parameters were assigned for each potential sampling location based on the materials to be sampled and the historical use of chemicals in a given area.

- Areas were further identified for subsurface investigation based on inspection of physical features and processes in the buildings and exterior areas. Sampling locations and analytical parameters were selected for both subsurface soil and soil vapor sampling.

Sample Selection. Sampling locations and analyses were selected for each of the six buildings and the oil yard based on the results of the site survey and historical-use information gathered from ITT. Tables 1 through 7 list the proposed sampling locations, the materials to be sampled, the number of samples per location, and the assigned analyses for each area. The number of samples and the areas selected for analyses are expected to provide sufficient information to assess the potential for contamination of the building materials and to characterize the materials for proper disposal.

Drawings ARSL-1 through ARSL-8, as modified from ITT AutoCAD files, identify the approximate locations within and in the vicinity of the buildings where samples will be collected. The sample numbers next to each location correlate with the sample numbers in Tables 1 through 7. Sampling locations from the second floor of Buildings 4 and 16 are not included on drawings, as ITT did not have AutoCAD files for these areas.

Schedule. The present sampling investigation will be divided into three tasks: **Task 1**--Asbestos and Residue Sampling, **Task 2**--Subsurface Soil-Vapor Sampling, and **Task 3**--Subsurface Soil Sampling. Task 1 will be completed prior to Tasks 2 and 3 to assess the presence and potential for hazardous materials within and around the buildings. The analytical results from Task 1 will then be used to reevaluate the sampling methodologies and locations currently proposed for Tasks 2 and 3. Soil vapor samples from Task 2 will assess the presence of volatile organic compounds (VOCs) in the vadose zone for the surveyed areas. If VOCs are detected, the vertical and lateral extent of the chemicals will be investigated. The VOC results will be evaluated to assign additional or alternative sampling locations for the Task 3 subsurface soil sampling. ICF KE will consult ITT if any additional sampling is necessary for proper characterization of the building materials and the surrounding areas.

Task 1: Asbestos and Residue Sampling. Approximately 180 asbestos samples will be collected for the present investigation. All asbestos sampling will be conducted with reference to the Asbestos Hazards Emergency Response Act (AHERA) guidelines (40 CFR 763). All workers sampling for potential asbestos containing materials will have current California Occupational Safety and Health Administration (Cal/OSHA) certifications for asbestos site-surveillance technicians (8 CCR 341.15 and 1529). The consultant making recommendations for the abatement of asbestos during demolition will also have current Cal/OSHA certification for asbestos work.

In addition, approximately 200 residue samples will be collected within the areas of investigation. All residue sampling will follow the protocols for wipe and bulk sampling outlined in the *Pre-Demolition Sampling and Analysis Plan for Building 3* dated April 5, 1993, included with this report as Appendix B.

Task 2: Subsurface Soil Vapor Sampling. A soil vapor survey will be conducted on site following the completion of Task 1. A truck-mounted Geoprobe will be used to conduct the field investigation. The Geoprobe utilizes a hydraulically-driven percussion hammer which pushes a ½-inch diameter steel probe to depths ranging from the surface to approximately 50 feet below grade, depending on the soil conditions. Soil vapor samples will be collected in glass sampling bulbs by drawing air through the probe with a small, portable vacuum pump. If soil vapor sampling is completed while the plant is still in operation, there may be areas inside the buildings which are inaccessible to the Geoprobe truck, for example inside small rooms or in areas where large equipment is blocking access. Manually installed shallow probes will be used at these locations in place of the Geoprobe. Coring through concrete slabs may also be necessary prior to sampling within the buildings.

The Standard Operating Procedures (SOPs) for soil vapor sampling are contained in Appendix D. These SOPs will provide the guidelines for all soil vapor sampling at the ITT site.

A California Regional Water Quality Control Board (CRWQCB)-certified mobile laboratory will be on site to conduct chemical analyses of the extracted soil vapors. The vapors will be analyzed for speciated volatile organic compounds (VOCs) using a modified version of EPA Method 8240 suited for soil vapor; the analysis methodology uses both Gas Chromatography and Mass Spectrometry (GC/MS), as described in Appendix C. If a mobile laboratory with GC/MS cannot be arranged, a GC mobile unit will be used. Soil vapor analysis using a GC unit is described in the CRWQCB's *Work Plan Requirements for Active Soil Gas Investigations, Well Investigation Program (WIP)*, provided in Appendix C. Quality Assurance/Quality Control (QA/QC) procedures for both the GC and GC/MS laboratories will follow the CRWQCB requirements.

Currently, 44 soil vapor samples are planned in the vicinity of the various buildings and the oil yard. For areas accessible to the Geoprobe, samples will be collected at approximately 10 feet below grade. If VOCs are detected at 10 feet, the Geoprobe will take progressively deeper samples, for example at 5 foot intervals, until the VOCs are no longer detected. For inaccessible areas, vapor samples will be collected manually to a depth of approximately 4 to 5 feet below grade. Each sampling location is described in the attached tables and identified on the enclosed drawings. Some of the sampling locations may change based on initial analytical results, and the program will be modified as necessary to optimize the characterization process.

Task 3: Subsurface Soil Sampling. Task 3 will be completed following the soil vapor survey. Soil sampling locations and depths will be reassessed based on the analytical results of Tasks 1 and 2. Currently, 41 soil sampling locations are planned, with samples collected at near surface depths of 1 to 3 feet below ground surface. For accessible areas, soil sampling will be completed using a truck-mounted Geoprobe. For inaccessible areas, a hand auger and drive sampler will be used to conduct the sampling. Concrete coring of slabs will be necessary for most interior sampling locations. Protocols for Geoprobe soil sampling are presented in Appendix E, the *Work Plan for Building 8, ITT Facility (Section 4.1.1, Pgs. 10-14)* dated October 15, 1991. The Standard Operating Procedures (SOPs) for hand auger soil sampling are presented in Appendix F.

Each of the soil sampling locations is described in Tables 1 through 7 and identified on the enclosed drawings. Analytical procedures for each sample will depend on the sample location as well as the sample depth. The selected analytical methods are identified below.

<u>Analytical Procedures</u>. Based on the investigation of the historical uses of the buildings, ICF KE identified potential chemicals for analyses. The goal of the survey was to select a representative number of samples to characterize the building materials for proper demolition and disposal. Some additional sampling may be necessary depending on the initial analytical results. Analyses for subsurface samples were also selected based on the historical uses of chemicals in the buildings.

Machine oils and coolants have been used within the buildings as well as some types of solvents, acids, and alcohols. Previous analytical data have suggested that PCBs may be present at low levels in machine shop areas as well as in select transformers, electrical switches, and fluorescent light ballasts in the buildings. In addition, sumps, trenches, and subsurface areas associated with passivate plating operations are suspected of containing metals. Based on the available information, the following analytical tests were assigned for the various tasks:

- **Task 1: Asbestos and Residue Sampling**

Asbestos	Bulk asbestos analysis--EPA Method 600/R-93/116
TRPH	Total Residual Petroleum Hydrocarbons--EPA Method 418.1
PCBs	Polychlorinated Biphenyls--EPA Method 8080
Metals	Title 24 CAC metals (Ag, As, BA, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn)--EPA Method 6010/7000
pH	EPA Method 9040/9045
BNA	Semi-volatile Organics Base/Neutral Fraction--EPA Method 8270
VOCs	Volatile Organic Compounds--EPA Method 624 for wastewater or 8240 for solids

- **Task 2: Subsurface Soil Vapor Sampling**

VOCs	Modified version of EPA Method 8240 (described in Appendix C)

- **Task 3: Subsurface Soil Sampling**

TPH	Total Petroleum Hydrocarbons--EPA Method 8015MOD (diesel)
PCBs	EPA Method 8080
Metals	CAC Metals--EPA Method 6010/7000
pH	EPA Method 9040/9045
BNAs	EPA Method 8270

Total residual petroleum hydrocarbon (TRPH) analyses, using EPA Method 418.1, will be conducted to assess concentrations of heavier chain petroleum hydrocarbons in the buildings. Total petroleum hydrocarbon (TPH) analyses, using EPA Method 8015MOD, will screen for additional lighter chain hydrocarbons such as diesel. TPH analyses will be conducted in place of TRPH analyses only for select samples suspected of containing these light chain hydrocarbons.

Select samples will also be analyzed for Title 26 CAC metals (EPA Method 6010/7000) in order to identify individual metal species in and around the buildings; subsequent analyses may test only for these select metals. BNA analyses in targeted sampling locations have also been selected to screen for semi-volatile organic compounds.

Quality Control Procedures. Quality control (QC) samples will be collected for the present investigation according to the protocols outlined in Appendix B, the *Pre-Demolition Sampling and Analysis Plan for Building 3* dated April 5, 1993. Both field blank and duplicate samples will be collected for at least 5% (or 1 in 20) of the total number of samples for each of the three tasks. The QC samples will provide an indication of the reliability of the sampling and analysis procedures.

Health and Safety Procedures. All field sampling will be completed according to the protocols outlined in the *Site-Specific Health and Safety Plan (HASP)*, included as Appendix F. It is expected that Level D personal protection will be used for most sampling. This will include Tyvek coveralls, disposable boot covers, latex undergloves, Nitrile overgloves, and safety glasses. Monitoring equipment which detect VOC vapors will be employed where necessary, particularly during sampling of any features containing sludges, oils, or liquids--for example drums, trenches, or sumps. Wipe sampling is not expected to produce any dust; however, during bulk sampling, mist water will be sprayed on all surfaces to prevent dust generation. For asbestos sampling of potentially friable materials, respirators equipped with HEPA filters will be worn by all personnel in the areas of sampling. Since the work will occur while the buildings are still occupied, friable asbestos sampling will be completed during off-work hours or in areas which have been properly isolated from the main work spaces. For any sampling completed during work hours, care will be used at all times to ensure the safety of ITT employees as well as the samplers.

At your convenience, please review the above sampling plan for Buildings 4, 5, 6, 14, 15, 16, and the oil yard at the ITT Burbank site. All sampling will commence once ITT and the County of Los Angeles Fire Department (LAFD) have approved this sampling plan. Upon completion of the sampling and analyses, ICF KE will send a final report to ITT and the LAFD. This report will contain a summary of the completed work, all analytical information, and suggested recommendations for handling potentially hazardous materials.

Please feel free to contact Tim Perini at (510) 419-6337 or Sue Kraemer at (916) 852-3710 if you have any questions concerning this sampling plan.

Sincerely,
ICF KAISER ENGINEERS, INC.

Timothy S. Perini
Project Engineer

Chris Meyer
Vice President

cc: Sue Kraemer, ICF

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At your convenience, please review the above sampling plan for Buildings 4, 5, 6, 14, 15, 16, and the oil yard at the ITT Burbank site. All sampling will commence once ITT and the County of Los Angeles Fire Department (LAFD) have approved this sampling plan. Upon completion of the sampling and analyses, ICF KE will send a final report to ITT and the LAFD. This report will contain a summary of the completed work, all analytical information, and suggested recommendations for handling potentially hazardous materials.

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LIST OF TABLES

LIST OF DRAWINGS

LIST OF APPENDICES

Appendix A	*Well Investigation Program--Supplementary Subsurface Program (File No. 104.0582).* Letter to California Regional Water Quality Control Board (CRWQCB) from ITT Aerospace Controls. November, 1992.
Appendix B	*Pre-Demolition Sampling and Analysis Plan for Building 3, ITT Burbank Site.* ICF Kaiser Engineers, April 5, 1993.
Appendix C	*Standard Operating Procedures for Soil Vapor Sampling.* ICF Kaiser Engineers, 1993.
Appendix D	*Work Plan Requirements for Active Soil Gas Investigations, Well Investigation Program.* California Regional Water Quality Control Board (CRWQCB), 1993.
Appendix E	*Work Plan for Building 8, ITT Facility (Section 4.1.1, Pgs 10-14).* Roy F. Weston, Inc., October, 1991.
Appendix F	*Site Safety and Health Plan for the Asbestos, Residue, and Subsurface Sampling of Buildings 4, 5, 6, 14, 15, 16, and the Oil Yard, ITT Burbank Site.* ICF Kaiser Engineers, August, 1993.

TABLE 1
BUILDING 15--PRINT SHOP/CREDIT UNION
ASBESTOS, RESIDUE, AND SUBSURFACE SAMPLING PROGRAM--ITT BURBANK SITE

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
BUILDING INTERIOR						
Bathrooms (2 total)	wallboard	1	15-1	bulk	asbestos	
	tape on piping	1	15-2	bulk	asbestos	Pipes located above men's room.
Storage area at north end of building	insulation	1	15-3	bulk	asbestos	Insulation is on top of the storage room.
NW corner of the building	concrete floor	1	15-4	chip/scrape	TRPH, PCBs	Floor staining in the general area.
	concrete floor	1	15-5	wipe or chip	PCBs	Floor staining.
Entrance area on east side of building	concrete floor	3	15-6 to 15-8	wipe or chip	PCBs	Misc. floor stains.
Mail room	flourescent light ballasts	2	15-9 to 15-10	bulk	PCBs	Sample two ballasts throughout the building.
	wallboard	1	15-11	bulk	asbestos	From inside mail room.
	concrete floor	2	15-12 to 15-13	wipe or chip	PCBs	
Credit Union Offices (4 total)	2'x 4' ceiling tiles	3	15-14 to 15-16	bulk	asbestos	2-3 different types ceiling tile.
	floor tiles	1	15-17	bulk	asbestos	One type of floor tile only.
	tile mastic	1	15-18	bulk	asbestos	
	insulation	1	15-19	bulk	asbestos	Sample above ceiling tiles or behind the walls.
Interior roofing material	foil-backed insulation	2	15-20 to 15-21	bulk	asbestos	The insulation covers the interior wooden roof structure.
BUILDING EXTERIOR						
Building roof	insulation/ waterproofer	2	15-22 to 15-23	bulk	asbestos	Sprayed on foam insulation covering the roof.
Exterior wall	stucco	1	15-24	chip	asbestos	
North side of building	small 1'x 1' x 1' sump/drain	1	15-25	residue or scrape	TRPH, PCBs	If a soily or sludgy residue is extracted from the sump, include metals and BNA analyses.
SUBSURFACE SAMPLING						
Photo-processing room	subsurface soil	1	15-26	geoprobe or auger soil sample	PCBs, metals	Sample below the concrete pad in the vicinity of the photo-processing sink.
NW corner of building	subsurface soil	1	15-27	geoprobe or auger soil sample	PCBs, TPH, metals	Sample below the concrete pad in the vicinity of the drain pipe.
Outside of NW corner of building	subsurface soil	1	15-28	geoprobe or auger soil sample	PCBs, TPH, metals, BNA	Sample through the center of the 1'x 1'x 1' sump/drain.

Asbestos — EPA Method 600/R-93/116
TRPH — Total Residual Petroleum Hydrocarbons--EPA Method 418.1
TPH — Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs — Polychlorinated biphenyls--EPA Method 8080.
pH — EPA Method 9040/9045.
BNA — Semi-volatile Organics--EPA Method 8270.
Metals — Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs — Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Miscellaneous areas	subsurface soil	5	15-29 to 15-33	soil vapor samples	VOCs	Soil vapor probes in the vicinity of the sump/drain, photo-processing room, and the printing area.

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 9040/9045.
BNA Semi-volatile Organics--EPA Method 8270.
Metals Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

TABLE 2
WASTE OIL YARD
ASBESTOS, RESIDUE, AND SUBSURFACE SAMPLING PROGRAM--ITT BURBANK SITE

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
SOUTH END OF AREA						
Covered shack--"used naptha/alcohol" area	concrete	3	OY-1 to OY-3	chip	TRPH (1 of 3), PCBs	Areas with staining should be sampled--eg. within the bermed area and on the concrete pad.
NORTH END OF AREA						
Trench/ditch around the northeast side of the site (in between the oil yard berm and the adjoining buildings	soil, misc. debris	3	OY-4 to OY-6	scrape	TRPH (1 of 3), PCBs	Appears to be a drainage area from the oil yard; note the drainage pipe from the "acid storage area" into the trench/ditch. Metals will be tested if a surface soil sample is collected.
SUBSURFACE SAMPLING						
Covered shack--"used naptha/alcohol" area	subsurface soil	2	OY-7 to OY-8	geoprobe or auger soil samples	TPH (1 of 2), PCBs	One sample through the concrete pad; one through the center of the bermed area.
Acid storage area	subsurface soil	1	OY-9	geoprobe or auger soil sample	metals, pH, TPH, PCBs	
Trench/ditch around the northeast end of the site	subsurface soil	2	OY-10 to 11	geoprobe or auger soil samples	metals, pH, TPH (1 of 2), PCBs	One sample from the very northeast corner of the site; one at the outlet of the drainage pipe into the trench/ditch.
Entire site	subsurface soil	6	OY-12 to OY-17	soil vapor samples	VOCs	Sample selected locations for VOCs--eg. the "used naptha/alcohol" area, the acid storage area, the trench/ditch, and the former waste oil sump and UST area.

Asbestos	EPA Method 600/R-93/116.
TRPH	Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH	Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs	Polychlorinated biphenyls--EPA Method 8080.
pH	EPA Method 9040/9045.
BNA	Semi-volatile Organics--EPA Method 8270.
Metals	Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Tl, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs	Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

TABLE 3
BUILDING 14--BUTLER BUILDING/RECEIVING AND SHIPPING
ASBESTOS, RESIDUE, AND SUBSURFACE SAMPLING PROGRAM--ITT BURBANK SITE

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
BUILDING INTERIOR						
Receiving/shipping offices	floor tiles	2	14-1 to 14-2	bulk	asbestos	1 sample from each office.
	tile mastic	1	14-3	bulk	asbestos	
	wallboard	1	14-4	bulk	asbestos	
	4'x 2' ceiling tiles	2	14-5 to 14-6	bulk	asbestos	1 sample from each office.
	flourescent light ballast	2	14-7 to 14-8	bulk	PCBs	Any two ballasts in the building can be sampled.
	insulation	1	14-9	bulk	asbestos	Located on the roof of the offices.
	insulation	1	14-10	bulk	asbestos	Potential insulation in the walls of the offices.
Main storage area	concrete floors	5	14-11 to 14-15	wipe or chip	PCBs, TRPH (2 of 5)	Confirmation samples that the floors are non-contaminated.
	vertical steel beams	2	14-16 to 14-17	wipe	PCBs, TRPH (1 of 2)	Sample any two beams.
	sheet metal siding	2	14-18 to 14-19	wipe	PCBs	
Roof of building	green fiber-like sheeting	1	14-20	bulk	asbestos	Sample one of twelve 15'x 4' sheets used as roof "windows".
Passageway connecting Buildings 4 and 14	insulation	1	14-21	bulk	asbestos	Potential insulation in the walls of the passageway.
BUILDING EXTERIOR						
Just north of the Building 4 and 14 passageway	soil/debris	1	14-22	scrape/chip	TRPH, PCBs	Small drainage area along the north side of the passageway; suspect materials may have collected in low spots in the pavement.
SUBSURFACE SAMPLING						
Outside area between Buildings 4 and 14	subsurface soil	4	14-23 to 14-26	soil vapor samples	VOCs	Sample approximately every 20' along the alley between Building 4 and 14.

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 9040/9045.
BNA Semivolatile organics--EPA Method 8270.
Metals Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

TABLE 4
BUILDING 5--MAINTENANCE DEPARTMENT/WASTEWATER TREATMENT AREA
ASBESTOS, RESIDUE, AND SUBSURFACE SAMPLING PROGRAM--ITT BURBANK SITE

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
BUILDING INTERIOR: WEST END						
Maintenance storage area	concrete floors	1	5-1	wipe or chip	PCBs	Slight, fairly uniform, floor staining throughout the room.
	ceiling board	1	5-2	bulk	asbestos	
	ceiling insulation	1	5-3	bulk	asbestos	Exposed on the NE side of room.
	wall insulation	1	5-4	bulk	asbestos	Insulation is sticking out of wall at the SW corner of the room.
	flourescent light ballast	1	5-5	bulk	PCBs	
Open shed	fiber-like wall sheeting	1	5-6	bulk	asbestos	
BUILDING INTERIOR: SOUTH END						
Maintenance offices	tiled floor	1	5-7	wipe	PCBs	Staining below the air conditioning unit at the NW corner of the main room.
	floor tiles	2	5-8 to 5-9	bulk	asbestos	One sample from each office.
	tile mastic	1	5-10	bulk	asbestos	
	ceiling tiles	1	5-11	bulk	asbestos	
	wallboard	1	5-12	bulk	asbestos	
	ceiling/wall insulation	1	5-13	bulk	asbestos	Wall and ceiling insulation appears to the same.
BUILDING INTERIOR: NORTH END						
Plating/debur/trench room	ceiling tiles	1	5-14	bulk	asbestos	Potentially friable material.
	door insulation	1	5-15	bulk	asbestos	Located on the sliding door on the west side of the room--friable.
	wall insulation	1	5-16	bulk	asbestos	SE corner of the room.
	concrete floor	4	5-17 to 5-20	wipe or chip	PCBs, TRPH (1 of 4)	Misc. floor staining throughout the room; more concentrated in areas near equipment.
	overhead steel members and piping	2	5-21 to 5-22	wipe	PCBs, TRPH (1 of 2)	Confirmation samples; beams and piping look clean.

Asbestos	EPA Method 600/R-93/116
TRPH	Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH	Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs	Polychlorinated biphenyls--EPA Method 8080.
pH	EPA Method 9040/9045.
BNA	Semivolatile organics--EPA Method 8270.
Metals	Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs	Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Plating/debur/trench room	trench debris	3	5-23 to 5-25	scrape/chip	TRPH (2 of 3), PCBs	Samples should come from different portion of the trenches; one sample should come from the trench sump along the east wall. Test for metals and pH if a residue material can be collected.
	trench liquids	2	5-26 to 5-27	liquid sample	PCBs, pH, metals, VOCs	One of the liquid samples should come from the sump trench.
BUILDING INTERIOR: EAST END						
Compressor area	Electrical switch oils	1	5-28	bulk	PCBs	Composite sample of the switches
	debris in sump/drain #1	1	5-29	chip/scrape	TRPH, PCBs	
	debris in sump/drain #2	1	5-30	chip/scrape	PCBs	
	concrete floor	2	5-31 to 5-32	wipe/scrape	PCBs	Oil staining around the compressors.
Wastewater treatment area	concrete floor	3	5-33 to 5-35	wipe or chip	TRPH (1 of 3), PCBs	Oil staining around pumps and misc. equipment.
	debris in small sump/drain	1	5-36	chip/scrape	PCBs	Located next to the water discharge/holding tank basin.
	debris in the water discharge/holding tank basin	1	5-37	chip/scrape	PCBs	
SUBSURFACE SAMPLING						
Trench/plating/debur area	subsurface soil	3	5-38 to 5-40	geoprobe or auger soil sample	pH, metals, TPH (2 of 3), PCBs	Samples taken along the axis of the trenches; one sample should come from the trench sump along the east side.
	subsurface soil	3	5-41 to 5-43	soil vapor samples	VOCs	
Open shed area (SW corner of building)	subsurface soil	1	5-44	geoprobe or auger soil sample	metals, PCBs, TPH	Possible location of a former sump; samples should be in the vicinity of this sump.
	subsurface soil	1	5-45	soil vapor sample	VOCs	See above.
Wastewater treatment plant area	subsurface soil	3	5-46 to 5-48	geoprobe or auger sample	pH, metals, PCBs, TPH (1 of 3)	Sample in the vicinity of the water treatment area.
	subsurface soil	3	5-49 to 5-51	soil vapor sample	VOCs	See above.

Asbestos	EPA Method 600/R-93/116
TRPH	Total Residual Petroleum Hydrocarbons–EPA Method 418.1.
TPH	Total Petroleum Hydrocarbons–EPA Method 8015MOD.
PCBs	Polychlorinated biphenyls–EPA Method 8080.
pH	EPA Method 6040/6045.
BNA	Semivolatile organics–EPA Method 8270.
Metals	Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Tl, V, Zn–EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs	Volatile Organic Compounds–Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

TABLE 5
BUILDING 6--RESEARCH AND DEVELOPMENT
ASBESTOS, RESIDUE, AND SUBSURFACE SAMPLING PROGRAM--ITT BURBANK SITE

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
BUILDING INTERIOR						
Main entrance (east side)	11"x 11" floor tiles	1	6-1	bulk	asbestos	Most of the SW portion of the building has these tiles; the rest of the floors are untiled.
	tile mastic	1	6-2	bulk	asbestos	
	wallboard	1	6-3	bulk	asbestos	Similar to the "soldering and clean room" and the "assembly area."
	2'x 2' ceiling tiles	1	6-4	bulk	asbestos	See above.
	flourescent light ballast	2	6-5 to 6-6	bulk	PCBs	One ballast sampled in this area; one other ballast will be sampled in a separate portion of the building.
Research & development lab/supervisor's office/R&D storage room	ceiling tiles	1	6-7	bulk	asbestos	This ceiling tile is different than that in the SW portion of the building.
	wallboard	1	6-8	bulk	asbestos	
	insulation	1	6-9	bulk	asbestos	Sample the insulation found above the ceiling tiles.
	concrete floor	2	6-10 to 6-11	wipe or chip	PCBs	
Soldering and clean room	11"x 11" floor tiles	1	6-12	bulk	asbestos	The tiles are similar to those in the entrance, alcohol cleaning area, and the assembly area.
	tile mastic	1	6-13	bulk	asbestos	
	2'x 2' ceiling tiles	1	6-14	bulk	asbestos	See above.
	floor tiles	1	6-15	wipe or chip	PCBs	From the SE corner of the room; floor staining underneath equipment.
Mold room machine shop	floor tiles	1	6-16	wipe	PCBs	
	floor tiles	1	6-17	bulk	TPH, PCBs	
Vapor phase room	pipe from the main soldering machine to the sewer	1	6-18	bulk fluid (if present), or wipe	TPH, metals, VOCs	Break the piping and sample the fluid inside. If liquid is not found, do not sample for VOCs.
Men and women's rooms and lounge area	ceramic tiles	1	6-19	chip	asbestos	Same tile in the men's and women's bathrooms.
West-side corridor (main building corridor)	wallboard	1	6-20	bulk	asbestos	

Asbestos	EPA Method 600/R-93/116
TRPH	Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH	Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs	Polychlorinated biphenyls--EPA Method 8080.
pH	EPA Method 9040/9045.
BNA	Semivolatile organics--EPA Method 8270.
Metals	Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs	Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Mold room storage	4'x 2' ceiling tiles	1	6-21	bulk	asbestos	Same ceiling tiles as in the maintenance room (off the mold room).
Mold room production area	concrete floor	2	6-22 to 6-23	wipe or chip	TPH (1 of 2), PCBs	Floor staining underneath the main equipment.
RD&E (mold room)	floor staining	2	6-24 to 6-25	wipe	PCBs	Floor staining under the equipment.
	wallboard	2	6-26 to 6-27	bulk	asbestos	Two types of wallboard in the room.
	debris from trench drain	1	6-28	bulk or scrape	TPH, PCBs	The drain is located at the very north end of this room along the line of the former building trench.
Building 6 ceiling	foil-backed insulation	2	6-29 to 6-30	bulk	asbestos	
	HVAC insulation	2	6-31 to 6-32	bulk	asbestos	Insulation around select ductwork.
BUILDING EXTERIOR						
North of the main entrance	misc. ground debris	1	6-33	bulk or scrape	PCBs	Area of staining around a chiller and exterior pump.
South of the main entrance	transformer oils	3	6-34 to 6-36	bulk	PCBs	The three existing transformers should be sampled.
	taping around exterior ductw ork	1	6-37	bulk	asbestos	
Southwest corner of building	ground debris	1	6-38	bulk	PCBs	Sample the area stained the dripping pipe at the SW corner of the building.
	pipe fluid	1	6-39	wipe	PCBs	Wipe sample the inside of the pipe described above.
SUBSURFACE SAMPLING						
Former trench running north-south through the center of Building 6	subsurface soil	3	6-40 to 6-42	geoprobe or auger soil sample	TPH (2 of 3), PCBs, BNA	The trench was concrete-filled by ITT Aerospace when the building was bought from General Controls.
	subsurface soil	2	6-43 to 6-44	soil vapor sample	VOCs	One sample along the length of the trench; sample also in the vicinity of the trench drain (north end of the building).
Molding machine shop	subsurface soil	1	6-45	geoprobe or auger soil sample	TPH, PCBs	Sample near the center of the room.
	subsurface soil	1	6-46	soil vapor sample	VOCs	
Vapor phase room	subsurface soil	1	6-47	geoprobe or auger soil sample	TPH, PCBs, metals	Possible former chemfilm process location.
	subsurface soil	1	6-48	soil vapor sample	VOCs	
Alcohol cleaning room	subsurface soil	1	6-49	soil vapor sample	VOCs	Sample near the center of the room.

Asbestos	EPA Method 600/R-93/116
TRPH	Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH	Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs	Polychlorinated biphenyls--EPA Method 8080.
pH	EPA Method 9040/9045.
BNA	Semivolatile organics--EPA Method 8270.
Metals	Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs	Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Building exterior	subsurface soil	1	6-50	geoprobe or auger soil sample	TPH, PCBs	Sample on north side of the main entrance (i.e. near the exterior pump and chiller).
	subsurface soil	1	6-51	geoprobe or auger soil sample	TPH, PCBs	Sample at the SW corner of the building where the pipe is dripping oils.
	subsurface soil	2	6-52 to 6-53	soil vapor sample	VOCs	One sample outside of the interior trench sump (north end); one sample outside of the Vapor Phase Room and the Moldroom Machine Shop

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 6040/6045.
BNA Semivolatile organics--EPA Method 8270.
Metals Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Tl, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

TABLE 6
BUILDING 16--ASSEMBLY AREA AND ADMINISTRATION BUILDING
ASBESTOS, RESIDUE, AND SUBSURFACE SAMPLING PROGRAM--ITT BURBANK SITE

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
BUILDING INTERIOR: FIRST FLOOR--ASSEMBLY AREA						
Harper administration office (east side of bldg.)	insulation	1	16A-1	bulk	asbestos	Insulation above the office.
	2'x 4' ceiling tile	1	16A-2	bulk	asbestos	
	floor tile	1	16A-3	bulk	asbestos	
	tile mastic	1	16A-4	bulk	asbestos	
	flourescent light ballast	1	16A-5	bulk	PCBs	
Women's restroom	floor tile	1	16A-6	bulk	asbestos	The same material is found in the men's restroom (admin. section of Bldg. 16).
	ceramic wall tiles	1	16A-7	bulk	asbestos	See above.
	wallboard	1	16A-8	bulk	asbestos	See above.
	ceiling tile	1	16A-9	bulk	asbestos	See above.
Coffee room	ceiling tile	1	16A-10	bulk	asbestos	The tile in this room looks different than the previous rooms.
ITT-Harper QC rooms/ inspection office/manager's offices/conference room/ manufacturing lab	floor tile	2	16A-11 to 16A-12	bulk	asbestos	One sample should come from the QC room; different tile found in this area.
	tile mastic	1	16A-13	bulk	asbestos	
	light yellow wall covering	1	16A-14	bulk	asbestos	Sample from the QC room.
ITT-Aerospace stockroom	concrete floor	2	16A-15 to 16A-16	wipe or chip	PCBs	Confirmation samples; area generally looks clean.
Fastener department 158	overhead duct insulation	1	16A-17	bulk	asbestos	
	concrete floor	2	16A-18 to 16A-19	wipe or chip	PCBs	Confirmation samples; area looks quite clean.
Product flow engineering/ motor assembly line/ actuator assembly line/ assembly machine shop	misc. overhead piping, ducts, ceiling, steel beams	4	16A-20 to 16A-23	wipe	PCBs, TRPH (1 of 4)	Confirmation samples; area looks generally clean.
	concrete floors	4	16A-24 to 16A-27	wipe or chip	PCBs	Confirmation samples; generally little floor staining.

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 6040/6045.
BNA Semivolatile organics--EPA Method 8270.
Metals Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Varnish/epoxy/paint room (NW corner of building)	overhead insulation	1	16A-28	bulk	asbestos	Insulation located above the room.
	ceiling tile	1	16A-29	bulk	asbestos	
	concrete floor	2	16A-30 to 16A-31	wipe or chip	PCB, TRPH (1 of 2)	
	concrete block wall	1	16A-32	wipe or chip	PCBs, TRPH	Visible staining at the NE corner of the room.
	wall board	1	16A-33	bulk	asbestos	
Laser room/supervisor's office	floor tile	1	16A-34	bulk	asbestos	
	tile mastic	1	16A-35	bulk	asbestos	
	ceiling tile	1	16A-36	bulk	asbestos	
DCAS office/final buy-off area	duct insulation	1	16A-37	bulk	asbestos	Insulation located just outside of the DCAS office.
Central offices: QC/sales repair/conference room/ supervisor's office	floor tiles	2	16A-38 to 16A-39	bulk	asbestos	The tiles are slightly different than other portions of the building.
	tile mastic	1	16A-40	bulk	asbestos	
	ceiling tile	2	16A-41 to 16A-42	bulk	asbestos	
BUILDING INTERIOR: FIRST FLOOR--ADMINISTRATION AREA						
Misc. administration offices	flourescent light ballast	1	16B-1	bulk	PCBs	Select any (1) ballast and sample.
	insulation	2	16B-2 to 16B-3	bulk	asbestos	Samples of insulation from above the western offices and above the main lobby.
	ceiling tiles	2	16B-4 to 16B-5	bulk	asbestos	Randomly selected samples from different offices.
	wallboard	2	16B-6 to 16B-7	bulk	asbestos	See above.
Elevator shaft	misc. piping	1	16B-8	wipe	TRPH, PCBs	Sample the piping for oil residues.
Elevator control room	ceiling and wall board	2	16B-9 to 16B-10	bulk	asbestos	Potentially friable materials.
	concrete floor	1	16B-11	wipe or chip	PCBs	Misc. staining around the equipment.
	debris in floor drain	1	16B-12	chip/scrape	TRPH, PCBs	
BUILDING INTERIOR: SECOND FLOOR						
Men's/Women's restrooms (east side of building)	wall tiles	1	16C-1	bulk	asbestos	

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 9040/9045.
BNA Semivolatile organics--EPA Method 8270.
Metals Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Electrical room	oil inside electrical switches	1	16C-2	bulk	PCBs	
	concrete floor	1	16C-3	wipe or chip	PCBs	Misc. floor staining.
Assembly line area (west side of building)	transformer oil	2	16C-4 to 16C-5	bulk	PCBs	Two transformers along the west wall.
	overhead ductwor k	1	16C-6	bulk	asbestos	
	floor tiles	2	16C-7 to 16C-8	bulk	asbestos	Tiled area on west side of the second floor; two different color tiles.
	tile mastic	2	16C-9 to 16C-10	bulk	asbestos	
Administration offices	2'x 4' ceiling tiles	1	16C-11	bulk	asbestos	
	floor tile	1	16C-12	bulk	asbestos	25'x 25' tile area next to admin. officeson east side of 2nd floor.
	tile mastic	1	16C-13	bulk	asbestos	
Second floor area	concrete floor	4	16C-14 to 16C-17	wipe or chip	TRPH (2 of 4), PCBs	Confirmatory samples of floors; (3) wipes from the assembly area, (1) from the former administration area.
	ceiling foil-backed insulation	2	16C-18 to 16C-19	bulk	asbestos	
	liquid in waste oil drums	3	16C-20 to 16C-22	bulk	TRPH, PCBs, metals, VOCs	Sample for VOCs as well if a liquid sample can be collected; analyze for metals if sludge is collected.
	overhead piping and beams	2	16C-23 to 16C-24	wipe	TRPH (1 of 2), PCBs	Sample above the former assembly area.
BUILDING EXTERIOR						
Building roof	asphalt roofing tile	2	16D-1 to 16D-2	bulk	asbestos	
	taping on roof ductwork	1	16D-3	scrape/bulk	asbestos	
Southeast end of building	debris in low drainage area	1	16D-4	scrape/bulk	PCBs	Located adjacent to the wastewater treatment area.
North end of building near the compressor area/shack	debris in sump	1	16D-5	scrape/bulk	TRPH, PCBs, metals	The sump is ≈ 4' deep and 3'x 3'. Analyze for metals if a silty or sludgy material is collected.
	concrete floor	2	16D-6 to 16D-7	wipe/scrape	TRPH (1 of 2), PCBs	Staining around the equipment in the compressor area.
SUBSURFACE SAMPLING						
Assembly area of building	subsurface soil	2	16D-8 to 16D-9	geoprobe or auger soil sample	TPH, PCBs, metals	Sample beneath two floor drains (two that have been filled in with concrete).

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 9040/9045.
BNA Semivolatile organics--EPA Method 8270.
Metals Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Assembly Area	subsurface soil	2	16D-10 to 16D-11	soil vapor sample	VOCs	See above.
Varnish/epoxy/paint room	subsurface soil	1	16D-12	geoprobe or auger soil sample	metals, TPH, BNA	
	subsurface soil	1	16D-13 to 16D-14	soil vapor sample	VOCs	One sample from the interior of the room; one sample just outside the room.
North end of Building 16: compressor area	subsurface soil	2	16D-15 to 16D-16	soil vapor sample	VOCs	One sample near the existing sump; one sample from the compressor area.

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 6040/6045.
BNA Semivolatile organics--EPA Method 8270.
Metals Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Tl, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

TABLE 7
BUILDING 4--MACHINE SHOP
ASBESTOS, RESIDUE, AND SUBSURFACE SAMPLING PROGRAM--ITT BURBANK SITE

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
BUILDING INTERIOR: FIRST FLOOR						
NE corner: electrical (main breaker) room	transformer oil	3	4A-1 to 4A-3	bulk	PCBs	Labels on all transformers indicate <50 ppm PCBs in the oils.
	conrete floor	2	4A-4 to 4A-5	wipe or chip	PCBs, TRPH (1 of 2)	Areas of staining around the electrical equipment and the transformers.
	residue on furnace ventillation duct	1	4A-6	wipe or scrape	PCBs, TRPH	Black, powdery residue on the ductwork.
	overhead steel beam	1	4A-7	wipe	PCBs, TRPH	Randomly selected steel beam which shows some staining.
Storage area next to electrical room	flourescent light ballast	1	4A-8	bulk	PCBs	
	floor tile	1	4A-9	bulk	asbestos	Some of the red tiles look degraded and chipped.
	tile mastic	1	4A-10	bulk	asbestos	
	overhead piping insulation	1	4A-11	bulk	asbestos	
	vertical steel beam	1	4A-12	wipe	PCBs	Beam located just outside of the storage area: slight staining.
East end of northern hallway	overhead piping insulation	1	4A-13	bulk	asbestos	
	overhead piping	1	4A-14	wipe	PCBs, TRPH	Piping appears stained with residue.
	wallboard	1	4A-15	bulk	asbestos	
Elevator shaft	elevator piping	1	4A-16	wipe	PCBs	
Cafeteria (north end of building)	2'x 4' ceiling tile	1	4A-17	bulk	asbestos	
	floor tile	1	4A-18	bulk	asbestos	
	tile mastic	1	4A-19	bulk	asbestos	
	overhead duct insulation	1	4A-20	bulk	asbestos	Located just ouside of the cafeteria over the aisleway.
	insulation above cafeteria	1	4A-21	bulk	asbestos	
Men's/Women's restrooms	floor tile	1	4A-22	bulk	asbestos	One sample from either restroom.
	wall tile	1	4A-23	bulk	asbestos	One sample from either restroom.
	wallboard	1	4A-24	bulk	asbestos	

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 6040/6045.
BNA Semivolatile organics--EPA Method 8270.
Metals Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Janitor's closet	concrete floor	1	4A-25	wipe or chip	PCBs	Beneath the janitor's sink.
	water heater and piping insulation	1	4A-26	bulk	asbestos	
Aisle outside restrooms	wallboard	1	4A-27	wipe or bulk	PCBs	Some staining on the wall.
Planetary cell area (north end of building)	collection trench running East-West	2	4A-28 to 4A-29	scrape or chip	TRPH, PCBs, metals, VOCs	The trench is approximately ≈ 40' long, 1½" wide, and 1' deep; one sample should come from the sump within the trench. Analyze for metals if silty/sludgy; analyze for VOCs if there is standing liquid in the trench or sump.
	holding cell for former passivate plating operations	2	4A-30 to 4A-31	wipe scrape or chip	TRPH (1 of 2), PCBs, metals	Holding area is ≈ 8'x 20'and ≈ 6" deep; passivate plating operations formerly conducted here; use of irridite and chromate. Sample for metals if a silty/sludgy residue is collected.
	ceiling structural beams	1	4A-32	wipe	PCBs	Beams appear to be clean; confirmatory sample.
Hand debur area	floor tile	1	4A-33	bulk	asbestos	
	tile mastic	1	4A-34	bulk	asbestos	
	flourescent light ballast	1	4A-35	bulk	PCBs	
	overhead piping	1	4A-36	bulk	asbestos	
Coolant recycling area	underside of adjacent stairs (to second floor)	1	4A-37	wipe	PCBs	Coolants used in building for lubrication and cooling of machine parts.
	concrete floor	1	4A-38	wipe or chip	TRPH, PCBs	
Milling area (west and southwest side of building)	concrete floor	4	4A-39 to 4A-42	wipe or chip	TRPH (1 of 4), PCBs	Coolant and oil residues around much of the machinery in the area; random samples under the various equipment.
	transformers	4	4A-43 to 4A-46	bulk	PCBs	Four transformers in the milling area.
	tape on HVAC ductwork	1	4A-47	bulk	asbestos	Duct located at the SW corner of the building.
	floor drain	1	4A-48	scrape/ chip or wipe	PCBs, TRPH	These drains are located throughout the building; a few should be sampled; some are filled in with concrete.
	vertical steel columns	2	4A-49 to 4A-50	wipe	PCBs	Randomly select two columns which may have residues.
	misc. overhead piping	2	4A-51 to 4A-52	wipe	PCBs, TRPH (1 of 2)	Select locations at random.
	fiber-like wallboard	1	4A-53	bulk	asbestos	
	fiberglass insulation	1	4A-54	bulk	asbestos	Covering the ceiling over the adjacent engineering office.

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 9040/9045.
BNA Semivolatile organics--EPA Method 8270.
Metals *Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Tl, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).*
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Engineering office (south end of building)	4'x 2' ceiling tile	1	4A-55	bulk	asbestos	The tile is representative of the tile in the offices along the south end of the building.
	floor tile	1	4A-56	bulk	asbestos	See above.
	tile mastic	1	4A-57	bulk	asbestos	
Model shop office	floor tile	1	4A-58	bulk	asbestos	
	ceiling tile	1	4A-59	bulk	asbestos	
Hone and lap department/jig bore room	vertical steel column	1	4A-60	wipe	PCBs, TRPH	
	concrete floor	2	4A-61 to 4A-62	wipe or chip	PCBs	
	concrete block wall	1	4A-63	wipe or chip	PCBs	
	overhead air duct	1	4A-64	wipe	PCBs	
	overhead steel members	1	4A-65	wipe	PCBs, TRPH	
Tool cutter and grind room	tiled floor	2	4A-66 to 4A-67	wipe or chip	PCBs, TRPH (1 of 2)	
	concrete block wall	1	4A-68	wipe or chip	PCBs	Visible staining at SW portion of room.
	floor tile	1	4A-69	bulk	asbestos	
	board above optical machine room	1	4A-70	bulk	asbestos	
Model shop (depart ment 120)	misc. overhead piping and beams	2	4A-71 to 4A-72	wipe	PCBs	
	overhead fan	1	4A-73	wipe	PCBs	
	concrete floor	2	4A-74 to 4A-75	wipe or chip	PCBs, TRPH (1 of 2)	Misc. floor staining.
	concrete block wall	1	4A-76	wipe or chip	PCBs	
Offices on east side of building: inspection area (model shop)	ceiling tile	1	4A-77	bulk	asbestos	
	floor tile	1	4A-78	bulk	asbestos	
	tile mastic	1	4A-79	bulk	asbestos	
Welding area	concrete floor	1	4A-80	chip or scra pe	PCBs	Possible use of chromium and silver in this area; possible former sump location.
Functional test area	overhead piping along the east wall	1	4A-81	wipe	PCBs, TRPH	Visible residues.
	concrete floor	2	4A-82 to 4A-83	wipe or chip	PCBs, TRPH (1 of 2)	Floor staining around the machines.

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 8040/8045.
BNA Semivolatile organics--EPA Method 8270.
Metals Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Functional test area	overhead pipe insulation	1	4A-84	bulk	asbestos	
Grinding department (#036C)	concrete floor	2	4A-85 to 4A-86	wipe or chip	TRPH (1 of 2), PCBs	
	vertical steel beam	1	4A-87	wipe	TRPH, PCBs	
	overhead piping	1	4A-88	wipe	PCBs	
Central storage area (tool crib)	concrete floor	1	4A-89	wipe or chip	PCBs	Confirmatory samples; floor appears to be clean.
Inspection offices (central portion of building)	ceiling tile	2	4A-90 to 4A-91	bulk	asbestos	
	floor tile	2	4A-92 to 4A-93	bulk	asbestos	
	tile mastic	1	4A-94	bulk	asbestos	
	wallboard	1	4A-95	bulk	asbestos	
Valve body cell layout area	ducting above staging area	1	4A-96	bulk	asbestos	
	concrete floor	1	4A-97	wipe or chip	TRPH, PCBs	Misc. floor staining around the equipment.
Fabrication office	insulation on top of the office	1	4A-98	bulk	asbestos	
	transformer oil	1	4A-99	bulk	PCBs	The transformer is located behind the fabrication office.
Drill area	concrete floor	1	4A-100	wipe or chip	TRPH, PCBs	Misc. floor staining.
BUILDING INTERIOR: SECOND FLOOR						
Assembly area (east side of second floor)	flourescent light ballast	1	4B-1	bulk	PCBs	
	floor tile	2	4B-2 to 4B-3	bulk	asbestos	Two types of floor tile in this area--one is colored green, one is white.
	tile mastic	1	4B-4	bulk	asbestos	
	ceiling tile	2	4B-5 to 4B-6	bulk	asbestos	
	wallboard	2	4B-7 to 4B-8	bulk	asbestos	
	concrete or tile floor	4	4B-9 to 4B-12	wipe or chip	PCBs, TRPH (1 of 4)	Misc. areas showing staining.
	misc. piping, ducting, or steel members	4	4B-13 to 4B-16	wipe	PCBs, TRPH (2 of 4)	Selected locations which appear to have residues.
Men's/Women's bathrooms: (west side of second floor)	floor tile	1	4B-17	bulk or chip	asbestos	One sample from either restroom.
	ceiling tile	1	4B-18	bulk	asbestos	See above.

Asbestos	EPA Method 600/R-93/116
TRPH	Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH	Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs	Polychlorinated biphenyls--EPA Method 8080.
pH	EPA Method 6040/6045.
BNA	Semivolatile organics--EPA Method 8270.
Metals	Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs	Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Air handler room (A/C control room)	piping insulation	2	4B-19 to 4B-20	bulk	asbestos	
	concrete floor and misc. piping	2	4B-21 to 4B-22	wipe or chip	PCBs, TRPH (1 of 2)	
Interior ceiling	foil-backed insulation	2	4B-23 to 4B-24	bulk	asbestos	
BUILDING EXTERIOR						
Exterior roofing	insulation/ waterproofer	2	4C-1 and 4C-2	bulk	asbestos	Sprayed on foam insulation covering the roof (similar to Bldg. 15).
Boiler/air conditioning shed (NE side of bldg.)	electrical switch oils	3	4C-3 to 4C-5	bulk	PCBs	Three switches were found in this area.
	associated boiler piping insulation	2	4C-6 to 4C-7	bulk	asbestos	
	concrete floor	3	4C-8 to 4C-10	wipe or scra pe	PCBs, TRPH (2 of 3)	Misc. floor staining throughout the area.
	wallboard	1	4C-11	bulk	asbestos	Appears to be in a friable condition.
	wall and ceiling material	2	4C-12 to 4C-13	wipe or bulk	PCBs, TRPH (1 of 2)	
East side of building	stucco exterior	1	4C-14	chip	asbestos	
	collection trench	1	4C-15	bulk or scra pe	PCBs, TRPH, metals	140' long trench between Bldgs. 3 and 4.
High pressure pump/compressor area (east side)	concrete floor	3	4C-16 to 4C-18	scrape or wipe	PCBs, TRPH (1 of 3)	Misc. areas showing heavy staining.
	wall and ceiling material	2	4C-19 to 4C-20	wipe or bulk	PCBs, TRPH (1 of 2)	
SUBSURFACE SAMPLING: BUILDING INTERIOR						
Milling area	subsurface soils	3	4D-1 to 4D-3	geoprobe or auger soil sample	PCBs, TPH (1 of 3)	Sample below the equipment, floor drains, and the former electrical air line trench.
Coolant and recycling area	subsurface soils	1	4D-4	geoprobe or auger soil sample	PCBs	
	subsurface soils	1	4D-5	soil vapor sample	VOCs	
Planetary cell area	subsurface soils	3	4D-6 to 4D-8	geoprobe or auger soil sample	PCBs, metals, TPH (1 of 3), pH	One sample along the length of the collection trench; one sample beneath the former sump; and one sample in the center of the former holding cell.
	subsurface soils	2	4D-9 to 4D-10	soil vapor sample	VOCs	One sample below the holding cell; one sample near the former sump.

Asbestos	EPA Method 600/R-93/116
TRPH	Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH	Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs	*Polychlorinated biphenyls--EPA Method 8080.*
pH	EPA Method 8040/8045.
BNA	Semivolatile organics--EPA Method 8270.
Metals	Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).
VOCs	Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

Location of Sample	Sampled Medium	No. of Samples	Sample ID	Type of Sample	Expected Analyses	Comments
Welding area	subsurface soils	1	4D-11	geoprobe or auger soil sample	metals, PCBs	Possible former sump location.
Tool and cutter grind room	subsurface soils	1	4D-12 to 4D-13	geoprobe or auger soil sample	metals, PCBs	
	subsurface soils	1	4D-14	soil vapor sample	VOCs	
Functional test area	subsurface soils	1	4D-15	geoprobe or auger soil sample	PCBs, TPH	
	subsurface soils	1	4D-16	soil vapor sample	VOCs	Evidence of solvents used in this area.
Entire building	subsurface soils	2	4D-17 to 4D-18	geoprobe or auger soil sample	PCBs, TPH (1 of 2)	Select two floor drains at random and sample at depth.
	subsurface soils	2	4D-19 to 4D-20	soil vapor sample	VOCs	Sample the same two floor drains for soil vapor VOCs.
SUBSURFACE SAMPLING: BUILDING EXTERIOR						
Boiler/air conditioning shed (NE corner of building)	subsurface soil	2	4D-21 to 4D-22	geoprobe or auger soil sample	PCBs, TPH	
	subsurface soils	1	4D-23	soil vapor sample	VOCs	
High pressure pump/compressor area	subsurface soil	2	4D-24 to 4D-25	geoprobe or auger soil sample	PCBs, TPH	Sample in the vicinity of the former UST.
	subsurface soils	2	4D-26 to 4D-27	soil vapor sample	VOCs	See above.

Asbestos EPA Method 600/R-93/116
TRPH Total Residual Petroleum Hydrocarbons--EPA Method 418.1.
TPH Total Petroleum Hydrocarbons--EPA Method 8015MOD.
PCBs Polychlorinated biphenyls--EPA Method 8080.
pH EPA Method 9040/9045.
BNA Semivolatile organics--EPA Method 8270.
Metals *Title 26 CAC metals: Ag, As Ba, Cd, Cr, Hg, Pb, Se, Be, Co, Cu, Mo, Ni, Sb, Ti, V, Zn--EPA Method 6010/7000 (NOTE: The list may be shortened after identifying metals of concern following initial characterization).*
VOCs Volatile Organic Compounds--Analyses by EPA Method 624 for wastewater and 8240 for solids, or TO-14 or 8240MOD for soil vapor.

APPENDIX A

WELL INVESTIGATION PROGRAM -- SUPPLEMENTARY SUBSURFACE INVESTIGATION (FILE NO. 104.0582)

(Letter from ITT Aerospace Controls to the California Regional Water Quality Control Board dated November 30, 1992)

ITT

ITT Aerospace Controls Division

ITT Fluid Technology Corporation

November 30, 1992

Mr. Roy Sakaida
Supervising Water Resource Control Engineer
California Regional Water Quality Control Board
Los Angeles Region
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Monterey Park, California 91754-2156

WELL INVESTIGATIONS PROGRAM - SUPPLEMENTARY SUBSURFACE INVESTIGATION (FILE NO. 104.0582)

Dear Mr. Sakaida:

ITT is in receipt of your letter dated June 21, 1992. In this correspondence, the RWQCB approved recommendations made in our report entitled "Results of the Preliminary Groundwater and Soils Investigation", which was submitted to you in August, 1991.

At this time, ITT is requesting your review and approval of several modifications and supplements to those tasks. The approved, modified and supplemental tasks for the amended program are as follows:

<u>Tasks Already Approved/ No Modifications Requested Will Be Completed</u>

- o Data reconnaissance of off-site/regional activities.
- o Redevelopment of ground water monitoring wells PW-1, PW-2 and SW-1.
- o Installation of one upper water-bearing zone monitoring well near PW-2.

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Telephone (818) 842-6131 FAX (818) 842-8239

Tasks Already Approved/ Modifications Requested Will Be Completed Upon Approval

The RWQCB has approved a task for the drilling of three (3) additional soil borings in order to define the extent of PCB contamination. The modification we are requesting is to use the Geoprobe and Mobile Laboratory to define the lateral and vertical extent of TPH and PCB compounds instead of a boring program. It would be similar to the Building #8 work recently conducted in June, 1992. If the vertical extent of TPH and PCB compounds cannot be established with the Geoprobe rig, then focused deep sampling will be proposed as follow-up work. If this approach is approved, ITT will submit a work plan to RWQCB.

We are also proposing to continue ongoing monthly water level measurements, but modify the schedule for groundwater sampling from a quarterly to trimester schedule beginning January, 1993. This recommendation was made in our Third Quarter 1992 Progress Report. Groundwater samples have been collected on a quarterly basis for approximately two years. The groundwater data has been relatively consistent, i.e., individual parameter concentrations have been within an order of magnitude each sampling round, with few exceptions. Based on the volume and consistency of the data, trimester groundwater sampling and reporting is recommended.

Additional Tasks / Approval Requested

We are recommending the installation of two (2) additional upper water-bearing zone monitoring wells to be located near existing PW-3 and in the central portion of the site between Building 16 and Building 3.

We are also requesting to perform an additional task, and use the Geoprobe and Mobile Laboratory for additional soil vapor data collection at depth within the areas of Building 1, 2 and 3 to assist in remedial planning efforts.

Finally, we are proposing to postpone the deep soil boring task to investigate the next underlying water-bearing zone. Additional information on the hydraulics of the upper water-bearing zone must be analyzed prior to drilling into the deeper water-bearing zone, due to the potential issues of cross-contamination between the two zones. The results of the proposed modified program will provide information to attain a better understanding of these aquifer systems.

Provided the RWQCB is in agreement with the approach, the schedule for the modified program is shown on Figure 1. The sampling methodology and scope of work will be provided in more detail under separate cover once approval for the revised program is received. Additional requests included in your June 16, 1992 letter, and not included in this phase of work, will be addressed in future submittals.

We would like and opportunity to discuss these issues with you at your earliest convenience in order to begin our work. Thank you for your attention to this matter.

Very Truly Yours,
ITT Aerospace Controls

Teresa P. Olmsted
Manager, Environmental Projects

cc: D. Bacharowski/ W. Krostek - RWQCB
P. Kani - LAFD
ITT Distribution

attachment

WP/RWQ113092

APPENDIX B

PRE-DEMOLITION SAMPLING AND ANALYSIS PLAN FOR BUILDING 3

Prepared by

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Prepared for

ITT Aerospace Controls
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May 1993

1.0 INTRODUCTION

Building 3 at the ITT Aerospace Controls facility on Flower Street in Burbank, California is scheduled for demolition by Cleveland Wrecking Services in early 1993. Building 3 was primarily a part fabrication and storage facility and contains a number of auxilliary rooms. An initial sampling report, Weston (1990), indicated that elevated levels of PCBs and total residual petroleum hydrocarbons (TRPHs) exist in the isolated floor debris in the building as well as in the floor trenches, sumps, and equipment within the compressor, boiler, transformer, and waste-oil rooms. Few samples were taken from the structural and non-structural building materials of Building 3, most likely due to the lack of visual oily residues. The building materials include structural steel members, roofing materials, wall board, sheet metal, etc.. In order to assess PCB and TRPH levels for these building components, select bulk and wipe samples will be collected and analyzed prior to demolishing the building. Samples will be collected primarily from the north and northeast sections of Building 3 where the potential for elevated PCB and TRPH levels, if any, would be expected. Areas of concern are the plating room, the bright dip area, the rock tumble and sandblast room, the hydrogen annealing room, the welding department, as well as the compressor, transformer, boiler, and waste-oil rooms. Areas of lesser concern are the shipping department and the assembly and stock room located in the south and southwest portions of the building.

The total number of samples and the sampling locations will be determined in the field based on visual observation and historical use of the building areas. It is expected that approximately 10 to 15 wipe samples and 5 to 7 bulk samples will be taken. Only a few of these samples will come from the south and southeast portion of the building.

2.0 SAMPLING METHODS AND PROCEDURES

Samples of hard surfaces will be taken by two methods: (a) wipe sampling and (2) bulk sampling. Wipe samples are taken from any smooth surface which is relatively non-porous, such as aluminum siding, sheet metal, or steel beams. Bulk samples are taken from hard, porous surfaces such as brick, asphalt, wallboard, and wood. Both wipe and bulk samples may be taken if it is not known whether a surface is porous or not.

Wipe Sampling Wipe samples will use a 10 to 11 cm square filter paper (Whatman 40 ashless or Whatman 50 smear tabs) or 3-inch square Johnson and Johnson Steri gauze pads. Each wipe will be moistened with approximately 8 mL of a suitable solvent such as isooctane or specroscopic grade hexane. The moistened filter paper or gauze pad is then held with a pair of stainless steel forceps or protective gloves and rubbed over a 100 cm^2 area (delineated by a preprepared cardboard template) of the sample area surface. The pad should first be wiped vertically enough times to cover the designated area, then horizontally to cover the same area, or visa versa. The filter paper or pad is then placed in a precleaned sample bottle, which is then capped, properly labeled, and then placed in an ice chest. Sample collection information will be entered into a field log book and on a chain-of-custody form. Following sampling at each location, the gloves and the template will be discarded into a plastic bag for disposal of PCB and TRPH materials.

A summary of the procedures for wipe sampling is as follows:

1. Put on required personal protective clothing for wipe sampling (see Health and Safety Procedures below).

2. Use 3-inch square Johnson and Johnson Steri gauze pads or 10 to 11 cm square filter paper (Whatman 40 ashless or Whatman 50 smear tabs).

3. Roll up pad and insert into a precleaned wide-mouth glass sample bottle with a screw cap. The inside of the cap should be lined with Teflon or aluminum foil.

4. Apply 8 mL of solvent (hexane or isooctane) to the pad and then cap the bottle. Wait for 1 to 2 minutes for the solvent to distribute itself on the pad.

5. Open the bottle and empty the rolled up gauze pad into a gloved hand. Any excess solvent in the bottle should be poured onto the pad.

6. Place the 10 cm x 10 cm template over the desired sampling area. Hold one side of the pad (opposite the folded edge) and using a series of horizontal traverses completely wipe the designated area inside the template. The turn the pad over, still holding the side opposite the folded edge, and completely wipe the same area with a series of vertical traverses.

7. Open the pad and fold it over so that the two wiped sides are inside, and then roll it up.

8. Insert rolled pad into a new, clean bottle and screw on the cover.

9. Label the bottle with the time of sampling, the job number, the exact sampling location, sample number, and the analyses to be completed. Once a chain-of-custody form has been completed, the pad is ready for laboratory analysis.

10. The gloves used for the each sampling will be disposed of and then replaced with a set of new gloves prior to the next sample.

Bulk Sampling Wipe sampling may not be appropriate on some porous surfaces, such as wood, asphalt, concrete, wallboard, and brick, which may absorb PCBs and TRPHs. In some cases, these surfaces can be sampled by taking a discrete sample such as a piece of wood or paving brick. Otherwise, chisels, drills, hole saws, etc. can be used to remove sufficient samples for analysis. Samples less than 1 cm deep will be removed, placed in a clean glass sample bottle and then capped. The inside of the cap will be lined with Teflon or aluminum foil. Each sample container should be properly labeled (as above) and placed in an ice chest for transportation to the laboratory. Sample collection data such as date and time of sampling, exact sampling location, the sample number, and the analyses to be performed will be entered into a field log book and on a chain-of-custody form.

Equipment used to take the bulk samples will be cleaned with solvent and wiped with a disposable cloth prior to the next sampling. The protective gloves and wipe cloths used for each sampling will be properly disposed of in a plastic bag intended for PCB and TRPH materials prior to moving to the next sampling location.

Quality Control Procedures Quality control (QC) samples will also be collected for the present study. The QC samples will provide and indication of the reliability of the sampling and analysis process. The samples should be submitted to the laboratory at random. Both field blanks and duplicates will be collected for analysis.

- **Field Blanks:** One field blank will be collected for at least 5% (or 1 in 20) of the total bulk samples, and one for at least 5% of the wipe samples. The methods for each are as follows:

  a) Bulk sample blanks will be selected from a location which is expected or known to be non-contaminated.

  b) For wipe sample blanks, with gloved hands, the cap from a sample vial will be removed for the estimated time of normal wipe sampling (record this time) and the gauze will be allowed to air dry without applying it to any surface; or the wipe sample will be collected at a location which is expected or known to be non-contaminated.

- **Duplicates**: One duplicate will be collected for at least 5% (or 1 in 20) of the total bulk samples, and one for at least 5% of the wipe samples. For each type of sample, adjacent or nearly adjacent surface areas will be selected for sampling. The samples will be clearly identified as being adjacent to one another in the sample description forms.

3.0 ANALYTICAL PROCEDURES

Bulk and wipe samples will be analyzed for TRPH by EPA Method 418.1 and for PCBs by EPA Method 8080 at a certified analytical laboratory. The laboratory will make an effort to minimize any interference effects between chemicals which may cause high detection limits.

The analytical results from the above sampling will be used to determine the ultimate disposal and/or decontamination requirements for the ITT Building 3 demolition materials.

4.0 HEALTH AND SAFETY PROCEDURES

All sampling will be completed according to the protocols outlined in the site-specific Health and Safety Plan. It is expected that Level D personal protection will be used for all sampling. This may include Tyvek coveralls, latex undergloves, Nitrile overgloves, and safety glasses. The wipe sampling is not expected to produce any dust; however, during bulk sampling, mist water will be sprayed on surfaces to prevent any dust generation.

REFERNCES

Smith, John H., 1987. *Wipe Sampling and Double-Wash/Rinse Cleanup as Required by the EPA.* PCB Spill Cleanup Policy, United States Environmental Protection Agency, Chemical Regulations Branch. June.

Midwest Research Institute (MRI). *Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup.* MRI Report: Verification of PCB Spill Cleanup by Sampling and Analysis.

APPENDIX C

STANDARD OPERATING PROCEDURES
SOIL VAPOR SAMPLING METHODOLOGY
ITT BURBANK PROJECT

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August 1993

3.0 INTRODUCTION

Soil vapor sampling locations are selected and marked at each site prior to their collection. At each sample location, a soil probe is inserted into the soil, sealed at the surface using bentonite clay, and then purged and sampled through a Teflon tube into a glass sampling bulb using a portable vacuum pump.

Three methods of soil vapor probe installation are used to collect soil vapor samples: (1) manually installed shallow probes are installed to a maximum depth of 4.5 feet in areas of difficult access; (2) a truck-mounted hydraulically-driven percussion hammer method (Geoprobe) is used to install shallow to deep probes. The Geoprobe is utilized to obtain samples from surface up to a depth of 50 feet below grade (BG), depending on subsurface conditions; (3) the hollow-stem auger rig method is generally used in difficult drilling conditions or when target depths are greater than the Geoprobe can achieve. In addition, a hollow-stem auger drill rig or air rotary rig can be used to install semipermanent multilevel vapor probes which are constructed in a borehole.

At sites covered with concrete or asphalt, a pilot hole for the installation of the probes is drilled through the surface material using a hand-held rotary-hammer drill or a truck mounted drill.

3.1 MANUAL METHOD

The manual method can be used to install shallow probes using a hand held slide hammer device called a slam bar. A section of hardened steel rod is driven into the soil using the slide hammer to a maximum depth of approximately 4.5 feet BG. The steel rod is removed and a 5-foot length of Teflon lined copper tubing is inserted into the open hole. A cap fitted on the open end of the tubing prevents particles from entering the tubing during insertion. After insertion, the cap is removed by withdrawing the inner Teflon tubing a few inches. Hydrated bentonite clay is packed around the probe to seal the open annular space surrounding the probe at the surface in order to prevent ambient air (which would dilute or contaminate the sample) from being drawn into the pilot hole. Prior to sampling, the probe is purged of at least three volumes of the sampling train which consists of the tubing, the sample bulb, and the annular space between the tubing and the probe wall. The soil vapor is then collected in the glass sample bulb using a portable vacuum pump connected to the surface end of the sample tubing with a stainless steel Swagelok fitting.

3.2 HYDRAULIC HAMMER METHOD

The truck-mounted hydraulic percussion hammer (Geoprobe) can be used to install shallow to intermediate probes to depths between 5 and 50 feet BG. The sections of probe rod are constructed of 1-inch O.D. 4130, 4140, or stainless steel alloy pipe each 3 feet in length. A disposable or retractable drive point is inserted into a bushing on one end of the probe rod. The portion of the bushing directly above the drive point is comprised of a left-hand threaded fitting for attachment of the sampling tubing (train). Sections of rod are added as the probe is driven into the soil to the desired sampling depth. Upon reaching the sampling depth, the probe is withdrawn approximately 6 inches to allow the drive point to fall out or extend (in the case of the retractable point). The tube fitting is then exposed to the six inches of open annular space beneath the rod. A 5/16-inch diameter Teflon tube connected to a stainless-steel threaded fitting is inserted into the probe and screwed into the fitting at the bottom of the probe by rotating the tubing at the surface. Bentonite clay is placed around the probe rod at the surface to prevent ambient air form being drawn into the annulus space. The sampling train is purged of at least three air volumes using a portable vacuum pump prior to sampling.

3.3 HOLLOW STEM AUGER RIG METHOD

A hollow stem auger rig can be used to collect soil vapor samples in difficult soils or at depths greater than 50 feet. Vapor samples are collected using a sampling probe adapted to drill rods (A-rods). The drill rods (A-rods) are sections of 2-inch diameter hollow steel pipe four feet in length which are screwed together to construct a soil vapor probe to reach the required depths. The probe is installed inside an 8-inch diameter hollow stem auger using a slide hammer on the drill rig to drive the probe into the soil beneath the bit. To install a deep probe, the auger hole is advanced to the depth at which the A-rod probe is to be driven. The loose soil is removed from the bottom of the borehole by rotating the augers, and the augers are lifted six inches from the bottom of the borehole. A thick bentonite slurry is poured down the auger to fill the six inches of open annular space beneath the augers. The augers are lowered through the bentonite to the bottom of the borehole. To collect a soil vapor sample from the undisturbed soil, the A-rod probe is driven a minimum of three feet into the soil beyond the auger bit.

The sampling point holder is constructed of 2-inch diameter stainless steel, three feet in length, with a open bushing (point holder) at one end. A threaded opening at the top of the point holder allows attachment of the sample tubing (train) using a threaded stainless steel fitting. At the surface and prior to driving the probe into the soil, a 5/16-inch diameter Teflon tube is connected to the fitting and screwed into the threaded opening at the base of the probe using a specialized tool. After attachment of the Teflon tubing and fitting, the sample train and probe connection are leak checked by sealing the open end of the point holder with plastic wrap and pumping with a portable vacuum pump until zero flow is observed. (Leak detection is also checked by lowering a cloth soaked in hexane inside the auger to approximately 2 feet from the bottom of the hole). A disposable drive point is inserted into the point holder on the probe, and the probe is driven through the bentonite slurry into the soil beneath the augers. Upon reaching the sample depth, the probe is withdrawn 4 to 6 inches to allow the drive point to fall out and expose the tubing fitting to the space beneath the rod. After allowing the drive point to fall out, the bentonite slurry is allowed to set up for 15 minutes to form a seal at the probe/soil interface. This prevents ambient air from being drawn into the annular space beneath the probe. Prior to the collection of the soil vapor sample, additional bentonite slurry is poured into the augers to ensure a good seal.

3.4 MULTI-LEVEL VAPOR PROBES (MV PROBES)

Multi-level completion vapor probes are designed to allow the collection of vapor samples from discrete soil horizons. The placement of the MV probes is based upon the concentrations of volatile organic compounds detected by the shallow and intermediate vapor probes and the depth of ground water at each site. The MV probes may be utilized for periodic sampling and monitoring of VOC concentrations in the soil or may be incorporated into a subsequent soil vapor extraction and treatment system.

The MV probes are installed within an 8-inch diameter hollow stem auger borehole. The MV probes are constructed of specially designed and manufactured stainless steel soil vapor ports interconnected with 2- and 5-foot lengths of Schedule-40 PVC casing. The stainless steel sample ports have a 1/4-inch diameter sampling orifice covered by stainless steel mesh screening to prevent foreign objects from entering the port. The sampling orifice allows extraction of vapors from the sand pack and the natural soils surrounding the port. The 1/8-inch diameter Teflon tubing is attached to the sampling orifice with a Swagelok fitting and extends to ground surface through the inside of the casing. The soil vapor sample is extracted through the Teflon tubing. The threaded ends of the PVC casing are provided with O-rings which produce a relatively tight seal when connected together. Thermocouples are attached to the outside of the vapor ports, threaded through a small hole in the casing directly above the port, and extended to the surface on the inside of the casing. The hole threaded to the thermocouple is sealed with a silicone sealant. A subminiature electrical connector, which can be plugged directly into a digital temperature meter, is attached to the end of each thermocouple.

The boreholes for the MV probes are drilled using air rotary or hollow stem auger rigs, depending on site conditions, and sampled to a set depth or until groundwater or a potentially impervious clay layer are found. After reaching the total borehole depth, enough casing is installed to position the ports at the targeted soil horizons. If necessary, the borehole is backfilled to the desired depth using Rapid Set Non-Shrinking cement. Rapid-Set cement will harden in approximately 15 to 30 minutes, allowing construction of the well to continue. After setting the MV probe in the borehole, the probe is completed by backfilling the annular spaces surrounding the ports with sand and the sections between the vapor ports with Rapid-Set cement.

Vapor ports generally are separated by approximately 4 feet. About 2 feet of annular space surrounding each of the vapor sampling ports is backfilled with sand. The annular space surrounding the ports on the remaining MV probes is backfilled using only No. 3 sand. A 2- to 3-foot layer of Rapid-Set cement is placed above the sand pack around the uppermost port with the remaining annular space backfilled with neat cement or concrete.

The MV probes are completed at the surface by attaching the Teflon sampling tube to a PVC slip-cap using Swagelok fittings and plugs. The MV probe number, sample tubing, port depths, and thermocouple are identified with metal tags. A protective steel riser pipe or monument is placed around the MV probe. The inside of the riser pipe is backfilled to the level of the ground surface with cement. A weep hole is drilled through the riser at ground level, and pea gravel is added above the cement to permit drainage.

3.5 VAPOR SAMPLE COLLECTION

Following the installation of the vapor probes and/or multi-level vapor probes, purging and sampling is completed using a portable vacuum pump equipped with a flow regulator and flow meter. An in-line glass sampling bulb equipped with a Teflon stopcock at each end and a sampling septum is also included. The vacuum pump is connected to the Teflon sample tubing using a Swagelok fitting. The vapor probe is purged of approximately three sample train volumes (described in Section 3.1). The volume of the sample train varies with the length of Teflon tubing and the sample probe. Purging and sampling flow rates are typically 100 mL per minute, but are adjusted between 50 and 100 mL per minute if restricted flow is encountered.

After purging, the vapor sample is collected by closing the stopcock at each end of the sample bulb, trapping the soil vapor. The stopcock on the pump side of the sampling bulb should be closed slightly ahead of the stopcock on the venting side of the bulb. The samples are collected in 125 or 250 mL capacity glass sampling bulbs. After sampling, the bulbs are wrapped in aluminum foil to prevent photodegradation of the sample. The sample bulbs are labeled, placed in a closed container, recorded on a chain-of-custody record, and transported to the on-site mobile laboratory for analysis.

Data pertaining to the purging and sampling of the soil vapor probes are recorded in the field. Information includes sample numbers, sample collection times, sample locations, bulb identification numbers, sample depths, sample train volumes, volume purged, purge time and flow rates, types of probes, ambient air temperatures, humidity, barometric pressures and other pertinent site-specific observations.

3.6 EQUILIBRIUM SAMPLE COLLECTION

In areas with no groundwater where repeated attempts to collect a soil vapor sample show limited or no flow conditions (<50 mL/min) due to low permeability values, equilibrium samples should be collected. Equilibrium samples are used in conjunction with standard soil vapor samples to evaluate the need for additional lateral and vertical characterization of a site.

In the collection of an equilibrium sample, the portable vacuum pump attached to the sample train and probe is allowed to run for five minutes. After five minutes, the stopcock located on the pump side of the sampling bulb is closed. The negative pressure placed on the system is allowed to equilibrate for thirty minutes. A sample is then collected by closing the stopcock at the sampling side of the bulb. The presence of a sample in the bulb is verified upon injection into the laboratory Gas Cromatograph-Mass Spectrometer (GC/MS) by observing the change in pressures at both the jet separator and the ion source.

3.7 PROBE HOLE ABANDONMENT

After sampling, the probe is removed and the open hole is backfilled with granular bentonite clay. The used probe rods are placed in a separate holding rack from clean, decontaminated probes.

3.8 LEAK CHECKING PROCEDURES

During soil vapor sampling, it is essential that the extracted soil vapors are not diluted or contaminated with vapors from other depth intervals or with ambient surface air. Connections between the glass sampling bulb and the bottom annulus in the ground must be leak-tight. The glass sampling bulb has two Teflon stopcocks and a small rubber septum that are potential sources of ambient air intrusion. Therefore, it is important that the bulbs are thoroughly leak tested to ensure their integrity before, during, and after sampling.

The first leak check occurs after initial decontamination of the bulb. The cooled bulb is flushed with high purity air at 40 psi head pressure, and the exit arm of the bulb is plugged. Gross leaks are detected by listening for hissing noises. After several seconds, the entrance end stopcock is also closed. After approximately one minute, one of the stopcocks is opened. A hissing noise indicates that the bulb maintained internal air pressure.

Further leak checking is completed during sampling. After setting the ambient air flow through the flowmeter at 100 mL/minute, the flowmeter is connected to one end of a glass sampling bulb, still with both stopcocks closed. Zero flow indicates that the system is airtight up to and including the first stopcock. This stopcock is then opened, and a "rush" of pressured air is noted on the flowmeter. Pumping is allowed to continue until zero flow is observed. At this point, a partial vacuum inside the bulb remains, confirming the integrity of both stopcocks and the glass bulb septum.

Three additional tests for leakage are also performed; these are completed either on a spot-check basis or when leakage problems are suspected. The first involves holding one's finger over the very end of the sampling train (the reverse-thread fitting) and ensuring zero flow after the standing air is pumped away. The second involves closing the end of the sample train with a reverse-threaded male fitting with no center hole drilled out. A third check involves stuffing a hexane-soaked absorbent material, such as a Kimwipe, into the open surface end of the sample probe. This tests the subsurface portion of the sampling train including the rubber o-ring at the bottom of the tube. The presence of hexane in the sampling bulb would indicate ambient air intrusion in the sampling train.

3.9 DECONTAMINATION PROCEDURES FOR VAPOR SAMPLING EQUIPMENT

The probe, tubing, and parts are decontaminated by steam cleaning. The glass sampling bulbs are decontaminated by heating the bulbs from 100 to 240 °C for at least 30 minutes and then flushing the cooled bulbs with bottled, high-purity air. Bulbs that previously contained greater than 100 µg/L (ng/mL) of volatile organic compounds are pre-rinsed with deionized water and ultrapure methanol before heating. After decontamination, a vacuum is applied to the bulb with the stopcock closed. Each bulb is assigned an identification number, and the history of each bulb is documented. Suspect contaminants in a particular bulb could be checked by reviewing the bulb's concentration and decontamination history. After decontamination, blank vapor samples from bulbs which previously contained high concentrations of VOCs are collected and analyzed.

The steel probes are decontaminated by steam cleaning and then allowed to dry. Decontamination of the steel probes is not critical because the collected soil vapor never comes in contact with the steel. However, this procedure is necessary to ensure that no contamination is introduced into the ground from previous contaminated location. An adequate supply of probes should be available so that individual sections of probe are not used more than twice per day.

Decontamination of the Teflon tubing is essential. These lines should be flushed with deionized water and high-purity methanol. Larger diameter lines are then purged with high purity air for drying (the lines can be heat dried if the ambient temperature is below about 50 °F). Small diameter tubing is heated at 120 °C overnight. The stainless steel fittings and O-rings are soaked in methanol, sonicated, and allowed to air dry. A large number of these fittings and O-rings should be available at all times.

3.10 SAMPLING AND ANALYTICAL DOCUMENTATION

Sample collection procedures are documented on a field sample data sheet. Items to be included on these sheets are as follows:

- Sample number
- Time sample collected
- Sample location
- Sample depth
- Sample train volume
- Purge flow rate
- Purge time
- Volume purge
- Probe type
- Observations (i.e., ground conditions, soil type, surface water, sampling bulb condensation, odors, vegetation, etc.)
- Backfill procedure and materials used

The soil vapor data shall be compiled into laboratory data packages and submitted to the ICF KE project file no later than five working days after the field program. Each data package shall consist of the following:

- Raw analytical data including chromatograms, initial and continuing calibrations, tuning results,.

- Summary of the standards preparation for calibrations, and the preparation of laboratory control check samples, including the sources of the standards.

- List of operating conditions and instrumentation for each type of analysis.
- Summary of calibration methods and determination of detection limits. If one calibration standard is used for daily calibration, include the results of the daily response factor and percent differences from the average RF of the calibration curve.

3.11 SOIL VAPOR ANALYTICAL METHODOLOGY--EPA METHOD 8270MOD

A vapor sample, usually 1 mL in volume, is extracted from the sample bulb through the septum using a gas-tight syringe and injected onto a four-foot packed column of 1% SP1000 on Carbopack C, programmed from 70 to 230 °C using a Hewlett-Packard Model 5972 gas chromatograph. Turnaround time is about 15 minutes for the sample, not including bakeout time and temperature recycling, which translates to about three samples per hour. Each sample is delivered from the gas chromatograph to the mass spectrometer through a SGE jet separator interfaced via a 0.53 mm fused silica capillary tube directly into the source of a Hewlett-Packard model 5972 quadrapole mass spectrometer. The samples are analyzed by the mass spectrometer utilizing selective ion monitoring to detect and quantify the target compounds. A minimum of one ion per target compound is used, with dwell times of 50 to 200 milliseconds per ion. As a comparison, full scanning allows less than 10 milliseconds per ion. The increased dwelling time allows for greater sensitivity and precision of quantitation. Additional ions are also scanned, enabling the detection of volatile organic compounds which may be present in the sample. When an unidentifiable ion pattern is detected, a full scan run is performed on the mass spectrometer so that unknowns can be identified. When absolute rigor is required in these identifications, a pure standard is obtained and analyzed under the same conditions as is the unknown. Full scans are routinely run on at least 10% of samples.

Calibrations and determination of detection limits are done for the compounds listed in EPA Method 8240.

Below is a representative list of compounds and easily achievable detection limits. The list of detectable compounds may also include chemicals having suitable vapor pressures and Henry's Law constants which would allow them to be present in the soil vapor.

Analyte	Detection Limits for Soil Vapor (µg/L)
Methylene Chloride	0.3
Chloroform	0.2
1,1-DCE	0.5
1,2-DCA	0.3
1,1,1-TCA	0.2
Carbon Tetrachloride	0.3
TCE	0.4
Benzene	0.2
Freon-11	0.2
1,2-DCE	0.4
PCE	0.4
Toluene	0.3
Ethyl Benzene	0.4
Xylenes	0.4
Hydrocarbons	5.0
1,1-DCA	0.3
MEK	2.6
MIBK	0.5

Acetone	0.6
Dichlorobromethane	0.2
Chlorodibromomethane	0.3
1,1,2-TCA	0.4
1,1,2,2-PCA	0.2

3.12 QUALITY ASSURANCE

Quantification is effected by the use of external standards, with an initial five-point calibration, and daily calibration check standards to verify response factor stability. If greater than a 15 percent deviation is observed for the target compounds, a new 3- or 5-point curve is usually indicated. If greater than 25 percent but less than 50 percent deviation is noted, the response factors can be updated on the daily standard; then a second daily standard can be run with a 20 percent requirement of precision. The lowest standard will be at the detection limits.

Analytical blanks, using ambient air, are run after each standard and after samples where the possibility of carryover existed. Ambient air is used rather than ultrapure nitrogen or helium in order to more closely match natural soil conditions. Sample train blanks are run as required, often as spot checks on sample trains which were used on sites having high target compound values. Generally, even with trains that contained hundreds of parts per million of target compounds, the decontamination procedure is effective in removing traces of these compounds from the lines. Sampling train blanks may not be required if no analytes were detected in the samples.

A representative contaminant source site is sampled and resampled each day of the analyses to establish method confidence. Additional contaminant source sites can be sampled on a regular basis to provide additional support. Equilibrium conditions at the sampling site are verified by taking samples from the same (sealed) hole at several different times and at several (usually 3) different sampling volumes at constant flow rate.

Formal quantitative reports, including chromatograms, are produced upon completion of the analytical procedures, usually within 30 to 40 minutes after sample receipt. Reports of samples that are run on a given day are available by the end of the day, and results for samples of special interest are available as required.

A summary of the soil vapor QA/QC procedures are as follows:

- Daily GC/MS tuning using bromofluorobenzene (BFB) per CLP protocols for VOC compounds.
- Initial calibration of the GC/MS unit with VOC standards consisting of target analytes of known content and concentration performed at the beginning of the analysis sequence.
- Daily and continuing calibration of the GC/MS unit with one mid-point VOC standard consisting of a minimum of 9 compounds including 3 aromatics and 6 halogenated compounds representing short, medium, and long retention time groups, of known content and concentration, performed at a minimum of every 20 runs.
- Twice-per-day (once at the start of the day and once at the end of the day) analysis of a Laboratory Control Sample or Quality Control Check Sample (LCS); a type of performance evaluation sample of known concentration and identity of analytes. The LCS sample will contain a minimum of 9 compounds, 3 aromatic and 6 halogenated compounds. Response for each compound will be within 20% of the corresponding true value. Failure of the 20%

criteria indicates resolution of the problem prior to analyzing samples. The LCS is derived from an independent source from the daily calibration standard.

- Rinse sample bulbs with methanol, then distilled water; bake sample bulbs and syringes at 240 °C, and purge with high purity air or nitrogen prior to sample collection.
- Daily ambient air sample in the mobile laboratory with 1-mL syringe.
- Daily field duplicate sample in field.
- Labeling of sample bulbs to track sampling order (i.e., if bulb sample contains similar compounds as previous sample, additional samples is collected using different bulbs for QC purposes).
- Field blanks (N_2-purged bulbs, unopened) analyzed periodically (particularly after a bulb contains a high concentration of volatile compounds).
- Sample train blanks as required.
- Decontamination of probe material after each use.
- Recording of pertinent field data on sampling log sheets for each sample.
- A replicate analysis of a given sample, often at a different dilution; on the average, one per day or as indicated.
- A holding time of four hours for soil vapor samples is imposed.

3.13 SUBSURFACE SOIL TEMPERATURE MEASUREMENTS

Subsurface soil temperatures are taken using a thermocouple and a hand held digital thermometer manufactured and calibrated by Omega Engineering, Stamford, Connecticut. The thermocouples are made of Copper-Constantan (Type T) and calibrated with a listed limit of error of 1.0 °C. A temperature reading is obtained by plugging the thermocouple directly into the hand held meter using a subminiature electrical connector. The temperature meter is allowed to warm up for at least one minute prior to taking a reading. A check of the accuracy of the thermocouple probes and the thermometer is performed in the field by alternately placing the thermocouple probes into containers filled with ice water and boiling water.

Subsurface soil temperatures are taken concurrent with the shallow soil vapor sampling at each site using a thermocouple probe. A 5- or 10-foot thermocouple probe is inserted into the hole produced by the vapor probe and allowed to stabilize before taking a temperature reading. Dedicated thermocouple wires are installed at 5 and 10 feet below grade at one location on site to be monitored regularly.

3.14 SHALLOW SOIL SAMPLING WITH THE GEOPROBE RIG

The Geoprobe has a probe-driven soil sampling kit which is connected to a 3-foot 1-inch O.D. hardened steel tube with the piston tip in place. The tubing is then attached to the Geoprobe and driven into the soils with the hydraulic percussion hammer. Additional 3- to 5-foot probe lengths are attached and driven to the desired sampling depths. The piston tip of the probe is then removed, by inserting a rod which is screwed into the piston tip unlocking it from the sample assembly. The probe is driven approximately one foot deeper into the ground; as the probe advances, the piston tip is free to retract a similar distance, thus filling the sample tube with soil at this depth interval. The probe is retracted and the soil is then extruded immediately into a sampling jar to be sent to the lab for analysis; alternately, the tube itself is sealed with Teflon/aluminum foil and delivered to the on-site mobile laboratory, where it is either immediately analyzed or frozen for analysis at a later time.

The Geoprobe equipment is steam cleaned and air dried prior to sampling. The sampling tubes and tip are steam cleaned and rinsed with deionized water. If a open hole remains after sampling, the hole will be backfilled with a bentonite/cement grout.

APPENDIX D

WORK PLAN REQUIREMENTS FOR ACTIVE SOIL GAS INVESTIGATION
1993 WELL INVESTIGATION PROGRAM

State of California Regional Water Quality Control Board
Los Angeles Region

STATE OF CALIFORNIA
California Regional Water Quality Control Board - Los Angeles Region

WORK PLAN REQUIREMENTS FOR ACTIVE SOIL GAS INVESTIGATION
WELL INVESTIGATION PROGRAM (WIP)

The objectives of these investigations are to: 1) evaluate potential waste discharges which may impact ground water, 2) determine variation and extent of soil contaminants, 3) establish vapor distribution for the design of vapor extraction system (VES), and 4) aid in determining the potential efficiency and appropriate design for any cleanup action, including VES. The work plan should include, but not be limited to, the following:

Survey Design (location, number, depth, data quality objectives)

1. Provide a scaled facility plot plan depicting potential source areas and proposed soil gas sample points. Include location and coordinate of identifiable geographic landmarks (i.e., street center-line, benchmark, street intersection or wells).

2. Locate soil gas sample points using 20-30 foot grid in potential source areas and no more than 100 foot grid for the rest of the site (coarse survey). Provide rationale for the number, location, and depth of sample points.

3. Conduct close interval (10'-20' foot grid) multi-depth sampling (3 to 5 feet between points) in areas with known soil contaminants and where prior soil gas sampling has detected relatively high levels of VOCs at the site.

4. Real time analysis of samples allows for field modification of the sampling plan (for grid density, location, and depth) based upon test results. However, field adjustments are acceptable only if the decision-making criteria are included in the approved work plan and in consultation with Board staff.

5. If anomalous data (i.e., soil gas values 2 to 3 orders of magnitude different from trends indicated by surrounding samples) are obtained from a sample point, resample and reanalyze at that point.

Sample Collection

1. Obtain samples at an adequate depth (minimally 5 feet) below the ground surface to minimize atmospheric air interference.

2. Discuss techniques to determine optimal purge rates and volumes. Minimum purging (3 probe volumes maximum) is required so that the samples are representative of VOC levels in the formation around the probe tip. At the beginning of the survey, conduct a site-specific purge volume versus contaminant concentration

test where VOC levels are expected to be highest, for major lithologic units or when significant pressure change is encountered to ensure that samples are representative of site conditions. Adjust purge rate and time to achieve optimal purge volume.

3. Explain the zone of influence for soil gas sample points, taking into consideration soil types, land cover, drive point construction, and sample purge time/rate/volume. The vertical zone of influence from soil gas purging and sampling must not intersect the ground surface.

4. Discuss procedures to minimize cross contamination between sample points.

5. Detail soil gas sample collection, handling, and testing procedures. Record the atmospheric pressure and evacuation pressure at which the sample is collected and the sample volume. Discuss procedures to prevent collection of samples under vacuum.

6. Select and specify soil gas sampling equipment (e.g., gas tight syringe) that will not affect sample integrity.

<u>Sample Analysis</u>

1. An on-site mobile laboratory with laboratory-grade certifiable instrumentation and procedures is required for real time analyses of individual VOCs. Non-specific portable organic vapor analyzers and/or GC-based handheld detectors may not be used for sample analysis.

2. Specify target compounds analysis list. Detection limits of 0.01 to 1.0 μg/l (soil gas) must be attained. Justify the use of higher detection limits.

3. Specify and justify time between sample collection and analysis.

4. Specify column characteristics, initial and final column temperatures, rate of column temperature increase per minute, calibration materials (liquid vs. gas sample) and sample flow rate employed in order to determine problems that may be associated with coeluting compounds. The chromatograms for calibration standards shall be included in the final report and provided to staff in the field for review to ensure that target compounds can be identified.

5. Provide QA/QC procedures essential for establishing support of analytical data. Include, at a minimum, field blanks, equipment blanks, initial and continuing calibration checks, laboratory

control standards, and sample replicates. Sampling equipment blank should be sampled from a contaminant-free source, if ambient air is not contaminant free.

Data Interpretation/Report of Findings

1. Methods to be used for data interpolation (contouring) must be detailed. At a minimum, where justified by the data, isoconcentration plots for each chlorinated volatile organic and aromatic hydrocarbon compound detected, and for total chlorinated volatile organics and for total aromatic hydrocarbons for each sampling depth must be presented in the final report. Provide cross-sections depicting the geology and changes in contaminant concentration with depth.

2. Data collected during field sampling and laboratory analyses must be compiled in tabular format and results are to be reported as mass/volume (i.e., $\mu g/l$).

3. Report all chromatographic peaks detected during the analyses run and any tentatively identified compounds.

Companion Soil Sampling

1. Conduct the soil sampling and VOC analyses per this Board's WIP WORK PLAN REQUIREMENTS for INITIAL SUBSURFACE INVESTIGATIONS.

2. Borehole locations and sampling intervals shall be based on soil gas survey results. Obtain discrete, undisturbed companion soil samples. Use a minimum 2-inch diameter sample tube.

3. Board staff must be part of the data review to determine companion soil sample locations and the need for additional soil/soil gas sampling.

Soil Gas Guidelines for Data Package - Initial Demonstration of Laboratory Capability

1. The data package should consist of a concise tabular summary the key elements necessary to demonstrate method proficiency.

2. Incomplete or disorganized packages are subject to delay or rejection of review.

3. All raw data including chromatograms and instrument printouts that support Data Package results should also be included. They should be properly identified for easy review. Every compound in the chromatograms should be clearly identified.

4. Summary of standards preparation for calibrations, preparation of laboratory control check samples should be included. If they are purchased, sources of the standards should be included.

5. List the operating conditions and instrumentation for each type of analyses.

6. Summary of calibration methods and determination of detection limits should be included. If one calibration standard is used for daily calibration, include results of the daily response factor and percent differences from the average RF of the calibration curve.

7. Calibrations and determination of detection limits should be done for each and every compound listed in EPA Methods 8010 and 8020. For detection limits, a sample with a concentration at detection limit should be prepared and checked for recovery. The recovery should be at least 50%.

8. For initial calibration, at least a three point calibration should be done. One point should be at the detection limit.

9. A copy of your laboratory Standard Operating Procedures (SOP) should be included. SOP include but not limit to the following procedures:
   (a) Daily calibration method
   (b) Blank analysis
   (c) Laboratory quality control check sample analysis and frequency of this analysis during each day. For each day the last analysis should be done on QC check sample.
   (d) Procedures to handle when the sample concentration is outside the calibration linear range.
   (e) Confirmation of compounds detected
   (f) Duplicate analysis of samples
   (g) The holding time of the samples
   (h) Sample identification
   (i) QA/QC corrective actions
   (j) Report generation

List of Twenty Two (22) Primary Target Compounds
(Chlorinated Volatile Organics and Aromatic Hydrocarbons)

1. Carbon Tetrachloride
2. Chlorobenzene
3. Chloroethane
4. Dibromochloromethane
5. Dichlorodifluoromethane
6. 1,1-Dichloroethane
7. 1,2-Dichloroethane
8. 1,1-Dichloroethene
9. cis- and trans-1,2-Dichloroethene
10. Dichloromethane
11. 1,1,2,2-Tetrachloroethane
12. 1,1,1,2-Tetrachloroethane
13. Tetrachloroethene
14. 1,1,1-Trichloroethane
15. 1,1,2-Trichloroethane
16. Trichloroethene
17. Trichlorofluoromethane
18. Vinyl Chloride
19. Benzene
20. Ethylbenzene
21. Toluene
22. Xylenes

QA/QC AND REPORTING REQUIREMENTS FOR SOIL GAS INVESTIGATION

Initial Calibration

Initial calibration must be performed for all compounds in the 8010/8020 list. A minimum of 3 concentrations is required, while the lowest one must not be higher than three times the Method Detection Limit (0.1-1 μg/L). Identification and quantitation of environmental compounds must be based on calibration under the same analytical conditions (i.e. column, detector, and temperature program etc.). Change in any of these conditions or calibration standard stock solution must result in a new initial calibration.

Daily Calibration and QA/QC

These must be performed and results calculated to demonstrate satisfactory running condition of the GC before any environmental sample can be analyzed.

1. 1-Point (Mid-Point) Calibration

   A minimum of 9 calibration standards, including 3 aromatics and 6 halogenated compounds representing short, medium and long retention time groups, must be checked at the beginning of a working day. One-point calibration check is required for all compounds detected at a particular site to ensure quantification, i.e., additional runs may be necessary if compounds other than the 9 calibration standards are found. Therefore, it is recommendable to include commonly found volatile compounds in the initial 1-point calibration check. The response factor for each of the compounds must be within 15% of the corresponding value from the 3-point calibration, otherwise the GC must be re-calibrated.

2. Blanks

   Sampling equipment blank, ambient air sample, method blank and other appropriate blanks must be analyzed at least once at the beginning of the working day and as frequent as necessary during the rest of the day.

3. Quality Control (QC) Check Sample

   A minimum of two QC check samples (obtained from a source different from the calibration standards) must be analyzed each working day, one at the beginning and one at the end, i.e., bracketing the analysis of environmental samples. A minimum of 9 compounds as described earlier must be checked. Response for each compound must be within 20% of the corresponding true value. If the beginning QC check sample fails the requirement, the problem must be resolved before proceeding with sample analysis. If the end or any of the following QC check sample fails the requirement, then all environmental samples analyzed between the failed sample and the last acceptable QC check sample will be considered questionable. Therefore, it is recommendable to run QC check samples every 10 samples to ensure acceptable analysis.

Shortening the GC Run Time

Shortening the GC run time is acceptable only if it does not hamper identification and quantification of any compounds present at the subject site. A normal run must be performed whenever peaks are detected within retention time windows where co-elution is likely as indicated by the calibration chromatograms.

Compound Confirmation

Every compound detected at a site must be confirmed by a second column or mass spectroscopy identification. Usually one sample is adequate, and quantification is not required for the confirmation run.

Evaluation Check Sample

Soil gas investigations will be randomly selected for unannounced performance evaluation by requiring on-site analysis of check samples provided by this office.

Reporting of Sample Results and QA/QC Information

1. The date and time of injection, and analytical conditions must be provided for all environmental and QA/QC samples.

2. All concentrations must be reported in $\mu g/L$.

3. For (the most recent) initial calibration, the retention time and average response factor (RF) for each compound must be reported.

4. For daily 1-point calibration, the RF and percent difference from initial RF for each compound must be tabulated and reported.

5. For QC check samples, the true concentration, detected concentration, and percentage difference for each compound must be tabulated and reported.

6. For environmental samples, including any duplicates, the sample identification, sampling depth, purge volume, vacuum pressure, sampling time, injection time, injection volume, results, and any other sampling or analytical remarks, must be reported in a tabulated format. Unidentified or tentatively identified peaks must also be listed.

7. Chromatograms for calibration standards, QC check samples, and selected samples (e.g., samples with most compounds, highest concentrations, infrequent compounds, and representative samples for different source areas) must be submitted upon request.

8. Sample report forms containing all required sampling, analytical and QA/QC information are attached for references.

SOIL GAS INITIAL CALIBRATION STANDARD REPORT

DATE: ________________ ANALYST: ____________________ STD SOURCE: ___________________ MACHINE ID: ________________

COMPOUND	DETECTOR	1st CONC ________				2nd CONC ________				3rd CONC ________				RF_{ave}	SD	%RSD
		RT	MASS	AREA	RF	RT	MASS	AREA	RF	RT	MASS	AREA	RF			
Bromobenzene																
Bromodichloromethane																
Bromoform																
Bromomethane																
Carbon tetrachloride																
Chloroethane																
Chloroform																
Chloromethane																
Dibromochloromethane																
Dibromomethane																
Dichloromethane																
1,1-Dichloroethane																
1,2-Dichloroethane																
1,1-Dichloroethene																
c-1,2-Dichloroethene																
t-1,2-Dichloroethene																
1,2-Dichloropropane																
c-1,3-Dichloropropene																
t-1,3-Dichloropropene																
1,1,1,2-Tetrachloroethane																
1,1,2,2-Tetrachloroethane																
Tetrachloroethene																
1,1,1-Trichloroethane																
1,1,2-Trichloroethane																
Trichloroethene																
1,2,3-Trichloropropane																
Trichlorofluoromethane																
Vinyl chloride																
Benzene																
Chlorobenzene																
1,2-Dichlorobenzene																
1,3-Dichlorobenzene																
1,4-Dichlorobenzene																
Ethyl benzene																
Toluene																
m,p-Xylenes																
o-Xylene																

SOIL GAS DAILY CALIBRATION STANDARD REPORT

DATE: ______________________ ______________________

SUPPLY SOURCE: ______________________ ______________________

MACHINE ID: ______________________ ______________________

COMPOUND	MASS	RT	RF	%DIFF*	MASS	RT	RF	%DIFF*
Bromobenzene								
Bromodichloromethane								
Bromoform								
Bromomethane								
Carbon tetrachloride								
Chloroethane								
Chloroform								
Chloromethane								
Dibromochloromethane								
Dibromomethane								
Dichloromethane								
1,1-Dichloroethane								
1,2-Dichloroethane								
1,1-Dichloroethene								
c-1,2-Dichloroethene								
t-1,2-Dichloroethene								
1,2-Dichloropropane								
c-1,3-Dichloropropene								
t-1,3-Dichloropropene								
1,1,1,2-Tetrachloroethane								
1,1,2,2-Tetrachloroethane								
Tetrachloroethene								
1,1,1-Trichloroethane								
1,1,2-Trichloroethane								
Trichloroethene								
1,2,3-Trichloropropane								
Trichlorofluoromethane								
Vinyl chloride								
Benzene								
Chlorobenzene								
1,2-Dichlorobenzene								
1,3-Dichlorobenzene								
1,4-Dichlorobenzene								
Ethyl benzene								
Toluene								
m,p-Xylenes								
o-Xylene								

* %DIFF = percentage difference with average Response Factor from the latest initial calibration

Site Name and Location:

Sampling Date:

Sample Collected by:

Sample Analysed by:

Smple ID	Dpth ft	Pur V ml	Vacum in Hg	Smple Time	Injct Time	Injct V ul	Compound 1		Compound 2		Compound 3		Compound 4		Compound 5		Compound 6	
							Area	ug/l	Area	ug/l	Area	ug/l	Area	ug/l	Area	ug/l	Area	ug/l

Sampling and Analytical Notes:

Site Name and Location:

Sample Collected by:

Sampling Date:

Sample Analysed by:

Page 2 of

Smple ID	Dpth ft	Compound 7		Compound 8		Compound 9		Compound 10		Compound 11		Compound 12		Compound 13		Compound 14	
		Area	ug/l	Area	ug/l	Area	ug/l	Area	ug/l	Area	ug/l	Area	ug/l	Area	ug/l	Area	ug/l

Sampling and Analytical Notes:

SOIL GAS LABORATORY QUALITY CONTROL CHECK SAMPLES

DATE PERFORMED: ____________ ____________

INJECTION TIME: ____________ ____________

SUPPLY SOURCE: ____________ ____________

COMPOUND	TRUE CONC	DET CONC	%DIFF	TRUE CONC	DET CONC	%DIFF

DATE PERFORMED: ____________ ____________

INJECTION TIME: ____________ ____________

SUPPLY SOURCE: ____________ ____________

COMPOUND	TRUE CONC	DET CONC	%DIFF	TRUE CONC	DET CONC	%DIFF

APPENDIX E

WORK PLAN FOR BUILDING 8, ITT FACILITY

Subsurface Soil Sampling Methodology (Pgs. 10-14)

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Roy F. Weston Inc.

Prepared for

ITT Aerospace Controls
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October 1991

be sampled, especially in areas where high levels of PCBs are encountered. In areas where PCBs appear to have migrated laterally, sampling nodes may be skipped or only sampled at depths below 10 feet. The sampling points will be advanced until two consecutive soil samples yield 1 mg/kg or less PCB concentrations or until the limits of the Geoprobe are reached.

4.1.1 Soil Sampling Methodology

The field work will be conducted under a Health and Safety Plan prepared for the site. The Health and Safety Plan is included in Appendix A.

Soil Sampling Technique

A truck-mounted percussion hammer (i.e. Geoprobe) will be used to obtain undisturbed soil samples from depths up to 10 feet, and if necessary to a probable maximum of 30 feet (depending on the local lithology). The Geoprobe rig will be driven on the liner to sampling locations. Care will be taken to prevent damage to the liner. Tears or punctures will be sealed along with the individual sample hole locations by a liner patch.

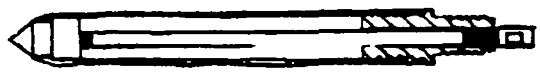
The Geoprobe will be driven to a sample node to obtain soil samples. A probe-drive soil sample kit (Figure 3) is connected to a 3-foot one-inch O.D. hardened steel tube with the piston tip in place. The tubing is then attached to the Geoprobe and driven into the soils. Additional 5-foot lengths are attached and driven to reach the desired depth of sampling with the Geoprobe hydraulic percussion hammer. The piston tip of the probe is then removed, by inserting a rod which is screwed into the piston tip unlocking it from the sample assembly. The probe is then driven approximately one foot deeper into the ground; as the probe advances, the piston tip is free to retract a like distance, thus filling the sample tube with soil at this depth interval. The probe is then retracted, the soil is extruded immediately for analysis of the target compound.

Due to the small diameter of the steel tubing used, a minor amount of soil, if any, will be generated. The soil cuttings generated will be containerized, labeled, and properly disposed in accordance of applicable regulations. If a open hole remains after sampling, the hole will be backfilled with a bentonite/cement grout at the end of each day.

Soil Sampling Tools

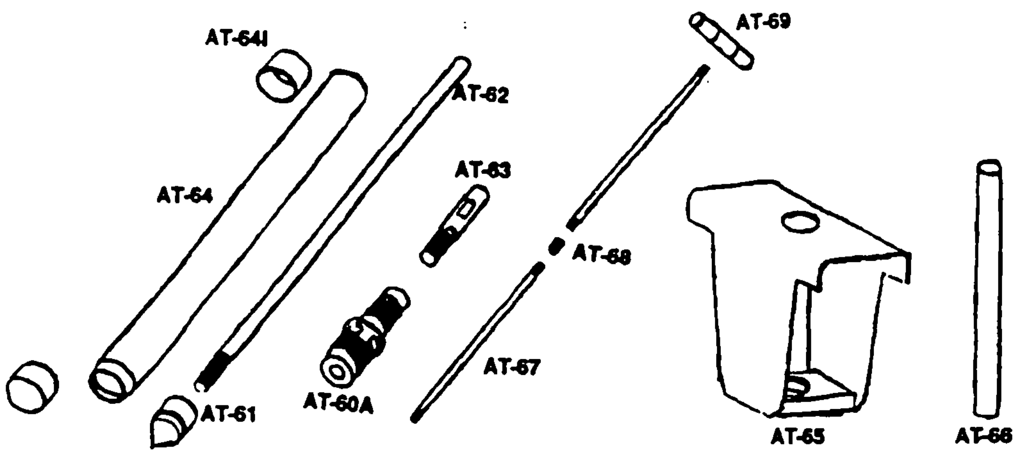
* **Probe-Drive Soil Sampler Kit**
Part No. AT-60K

Consists of "60" series tools. A sealed soil sampler which is driven to depth and then opened to obtain a soil sample. For complete information on this sampler, request Geoprobe's "Probe-Drive" Soil Sampler Brochure.



Assembled Probe-Drive Soil Sampler

Part No.	Description	No. Included in Sampling Kit (Part No. AT-60K)
AT-60A	Drive Head	2
AT-61	Piston Tip	2
AT-62	Piston Rod	2
AT-63	Piston Stop	2
AT-64	Sample Tube (11.5" in length, recovers 100 grams or larger sample)	10
AT-64I	Vinyl End Caps (for AT-64 Sample tube)	20
AT-65	Sample Extruder (fits 8 series machine)	1
AT-66	Extruder Piston	1
AT-67	Extension Rod (304 ss)	4
AT-68	Extension Rod Coupler	8
AT-69	Extension Rod Handle	8
		1



* **Patent Pending**

Probe-Drive Soil Sampler Parts

Figure 3: Soil Sampling Tools

4.1.2 Field QA/QC Procedures

Decontamination

The sampling equipment will be decontaminated using an alconox wash, then two tap water rinses, followed by a deionized water rinse. The equipment that contacts the soil samples will then be rinsed with hexane and air-dried; a final deionized rinse will follow. The hexane rinse will be containerized in a DOT approved container for proper disposal.

Rubber gloves, wipes, or other disposed material used in sampling or decontamination will be discarded into a plastic bag and then placed into a DOT approved container. These discarded materials, cuttings and hexane rinse will be properly manifested and disposed in accordance of applicable regulations.

Documentation

The soil sampling program will be conducted under the supervision of a California Registered Geologist. Documentation of field work and pertinent observations will be logged into a field notebook. A record of personnel onsite will be maintained.

Chain-of-custody procedures will document the sample history from the time of collection to receipt and analysis by the mobile laboratory. Any person accepting the responsibility for the samples will sign and date the form at the time of acceptance and relinquish the samples.

Prior to the commencement of work onsite, site-specific health and safety issues will be discussed and documented as required by the Health and Safety Plan (Appendix A).

4.1.3 Analytical Methodology

The soil samples collected from the Geoprobe sampler will be delivered to an onsite mobile laboratory which is Certified by the State of California for EPA Method 8270. Proper

Chain-of-Custody protocol will be utilized for the samples. The soil samples that are not immediately analyzed will receive a yellow TSCA PCB seal and will be refrigerated.

A modified EPA Method 8270 will be used to screen the soil samples for PCBs. Approximately 5 grams of representative soil sample are mixed thoroughly with several grams of anhydrous, granular sodium sulfate. Extraction solvent, usually 7-10 ml of 20% methanol in hexane, is then added along with surrogate compound(s) to measure recovery. These recovery compounds will be closely related to the target compound(s). The extraction bottles are then sonicated and shaken or stirred vigorously for at least thirty minutes, allowed to "settle" for a few minutes, filtered through a 0.45 micron teflon frit, then dried through a small column of anhydrous sodium sulfate. Internal standards are then added, and the sample delivered for analysis.

Several microliters of the extract are injected onto a 0.25 micron capillary column coated with DB-5 or equivalent, programmed at about 150 to 290 degrees Celsius, then delivered to a mass spectrometer for analysis. Ion chromatograms of representative components of the PCBs are then used versus the internal standards for quantification and identification.

It may be necessary to extract significantly more than 5 grams of sample either directly or by multiple extraction and combining of the extracts. In the same vein, duplicate analyses will serve both the function of measuring analytical variability and homogeneity of the samples; therefore approximately 10% of all samples will be analyzed in duplicate.

Extraction efficiency may vary according to the soil types and number, identification, and concentration of the target compounds present. Several techniques are used to ensure near-total extraction of the target compounds. Approximately 5% of the samples are run in triplicate with two different extraction times. If the variation between the true duplicates is significantly less than that between the time available duplicates, laboratory corrective analytical measures may be indicated. If significant difference is noted between the two extraction schemes, corrective analytical methods may be necessary.

Quantitation will be effected much as per EPA method 8080 but with the added advantage of using ion profiles rather than ordinary peak profiles. The detection limit achievable for this modified method 8270 for the individual Arochlor compounds is 1.0 mg/kg.

At a minimum, the laboratory QA/QC requirements will consist of field and reagent blanks, calibration check standards, matrix spikes, surrogate recoveries, and laboratory quality control samples. The QA/QC data will be reported. The analytical results will report detection limits, as well as trace amounts detected below detection limits.

4.1.4 Data Evaluation and Report Preparation

The data will be evaluated to assess the lateral and vertical extent of PCB in the soils in the former Building 8 area. The data will be presented in tabular and graphical form (cross-sections). The report will summarize whether further delineation of the soils is required. If sufficient data are obtained, a closure plan will be prepared for the Building 8 site.

4.1.5 Schedule

The work as delineated in this plan is expected to be completed and a report submitted within 15 weeks of the start of field work.

APPENDIX F

STANDARD OPERATING PROCEDURES FOR SURFACE SOIL AND SEDIMENT SAMPLING ITT BURBANK PROJECT

Prepared by

ICF Kaiser Engineers, Inc.
11290 Point East Drive
Rancho Cordova, CA

Prepared for

ITT Aerosapce Controls
1200 S. Flower Street
Burbank, CA

August 1993

3.1.0 PURPOSE

This SOP provides instructions that are to be followed in collecting soil and sediment samples. This SOP can be used in conjunction with the ICF Kaiser Engineer's SOPs entitled Sample Containers and Preservation and Sample Packaging and Shipment.

3.1.1 SOIL SAMPLING

Soil samples may be collected by either using hand tools, i.e., trowel, shovel, post hole digger, slam bar, auger, or by a power drive sampling device such as split spoon or Shelby Tube. The sample collection method used should be noted in the field logbook. Sections 3.1.1.1 through 3.1.1.3 provide instructions for soil sampling using hand tools. Section 3.1.1.4 discusses split spoon and Shelby Tube sampling. For hand-tool sampling the following table is provided to aid in selecting the proper tool based on the prescribed depth of the sample.

Depth	Hand Tool
0-1 foot	stainless steel trowel or shovel
1-8 feet	hand auger

Once the sampling location has been selected, all vegetation and loose material shall be removed from a circular area approximately 2 feet in diameter. The purpose of this step is to prohibit surface material from falling into the sample hole and possibly contaminating the sample. Also, a level surface will facilitate hole depth measurements.

To prevent potential surface contamination from any subsurface sample contaminants, plastic sheeting should be placed adjacent to the sample location. All subsurface material that is collected must be placed on this sheeting.

3.1.1.1 Shovel and Trowel Sampling

When the prescribed sample depth is less than 2 feet, a decontaminated shovel and stainless steel trowel can be used, following the sequence of steps described below:

(1) Label all bottles with tags and labels. Fill out all information except sampler's name/initials and the actual date and time. Sort bottles, one set per sampling location with additional sets as needed for field duplicates.

(2) Note exact location of the sample in the field logbook. If not tied in to a surveyed grid system or some other well documented system, measure distances and direction from stationary landmarks. If possible, photograph the location. As appropriate, spray paint or wooden stakes should be used to mark the location.

(3) Use a decontaminated shovel to remove the overburden to the prescribed depth and place excavated material on the plastic sheeting.

(4) At the time of individual sample collection, record date, time, and sampler's name/initials on all sample containers and in the field logbook.

(5) At the required depth, remove soil from the bottom of the hole and place into the prescribed sample containers. Periodically, place ssome soil into a decontaminated stainless steel bucket for composite sampling, if required. Attempt to eliminate all non-soil materials from the samples, such as rocks, trash, leaves, etc.

(6) If the samples are being analyzed for volatile organic compounds (VOCs), place the soil directly from the hole into the specified sample container. VOC samples should be collected first in order to minimize volatilization. VOC sample containers should be tightly packed with soil using a decontaminated stainless steel trowel, leaving as little airspace in the vial as possible.

(7) Using the trowel, fill the remaining sample containers 3/4 full with soil.

(8) At each sampling location, decontaminate the outside of the sample containers, bag the samples in a ziplock bag, and place in a cooler. For sample preservation, the cooler should contain ice.

(9) Replace excavated material from the plastic sheeting into the sampling hole and cap with removed vegetation.

(10) Decontaminate the sampling equipment for the next sample. (If possible, have a sufficient quantity of clean decontaminated trowels available so that each of the soil samples can be taken with a separate trowel and decontamination can be performed on all the trowels at the end of the sampling effort rather than between each sample.)

(11) Field soil sample duplicates are to be collected either by compositing the soil in a decontaminated stainless steel bucket (a composited field duplicate) or sampling from a close adjacent location (a collocated field duplicate). Follow the site-specific sample plan and document the duplicate collection process in the field logbook.

3.1.1.2 Hand Auger or Slam Bar Sampling

An auger or slam bar sampler may be used for soil sample collections between 1 and 8 feet. Hand augers consist of a large stainless steel bit (with varying diameters) connected at the end of a steel rod which can be turned manually into the soil. Extra sections of rod can be added to the auger for deeper soil samples. A slam bar sampler consists of a small stainless steel casing attached at the end of a steel rod which is driven into the ground with a slide hammer device. A brass sleeve is placed inside the casing prior to sampling so that a discreet sample can be collected from a specific depth. Both augers and slam bar samplers do not work well in rocky soils. The following procedures should be followed when sampling with these devices:

(1) Label all bottles with tags and labels. Fill out all information except sampler's name/initials and the actual date and time. Sort bottles, one set per sampling location with additional sets as needed for field duplicates.

(2) Note exact location of the sample in the field logbook. If not tied in to a surveyed grid system or some other well-documented system, measure distances and direction from stationary landmarks. If possible, photograph the location. As appropriate, spray paint or wooden stakes should be used to mark the location.

(3) On the auger or slam bar, use a tape measure to locate the appropriate sampler distance from the bottom of the auger and attach a piece of tape to the auger extension to indicate the prescribed

sample depth.

(4) Place the auger above the selected sample location and turn the "T" handle clockwise (as viewed from above) to screw the auger into the soil, pushing firmly downward.

(5) Remove soil approximately 1-foot intervals with the auger bit until sample depth is reached. Expel each soil "plug" by pushing the soil from the top of the auger out the end of the bit. Place the excavated material on a plastic sheet.

(6) Upon reaching the desired depth, either the auger bit or the slam bar sampler can be used to collect a sample. Using the auger only, collect the sample from the soil "plug" removed from the required depth; place the sample into a sample container using a decontaminated stainless steel trowel. For slam bar sampling, place the end of the slam bar in the hole once the auger has reached the desired depth. Use the slide hammer to drive the slam bar casing (with the brass sleeve) into the soil. Remove the casing and slide out the brass liner. Cover the ends of the liner with Teflon film and a plastic cap and then tape the ends with duct tape.

(7) At the time of individual sample collection, record date, time, and sampler's name/initials on all sample containers and in the field logbook.

(8) If the samples are being analyzed for VOCs, the slam bar sampler should be used to minimize exposure of the sample to the air. If only an auger is available, collect the VOC sample as soon as possible upon pulling the soil "plug" from the hole. For this sampling method, VOC sample containers should be tightly packed using a decontaminated stainless steel trowel leaving as little airspace in the vial as possible.

(9) For auger sampling, fill the remaining sample containers 3/4 full using a trowel. For slam bar sampling, collect as many brass liners as is necessary.

(10) If VOCs are not an analytical parameter and if a composite sample is preferred, periodically place a small amount of soil in a decontaminated stainless steel bucket (e.g., every foot) and, using a decontaminated stainless steel trowel, mix soil prior to filling sample containers.

(11) After each sampling location, decontaminate the outside of the sample containers, bag the samples in a ziplock bag, and place in a cooler. For sample preservation, the cooler should contain ice.

(12) Replace excavated material in the auger hole or use bentonite and cement grout if downward migration of contaminants is a concern.

(13) Decontaminate the sampling equipment for the next sample.

(14) Field soil sample duplicates are to be collected either by compositing the soil in a decontaminated stainless steel bucket (a composited field duplicate) or sampling from a close adjacent location (a collocated field duplicate). Follow the site-specific sample plan and document the duplicate collection process in the field log book.

3.1.1.3 Split Spoon/Shelby Tube

A split spoon sampler is used to take subsurface soil or sediment samples by being forcefully driven into the soil at the bottom of a borehole (similar to the slam bar sampling described above). A drill rig is used to advance sections of hollow stem auger into the ground in order to create a borehole. Split spoon samples may be retrieved at selected intervals or along the entire length of a bore hole to obtain an unbroken record of the subsurface soil layers. Continuous samples may start from the surface and continue down to a specified level or from a subsurface point downward.

A split spoon sampler is threaded to the end of steel drill rod which is connected to the drill rig. The sampler can be split into two separate halves, with 6-inch brass sleeves placed inside the sampler. Generally, 3 or 4 sleeves per split spoon are required. Sampling can also be completed without the brass liners but requires a separate sample container.

The sampler is lowered to the bottom of the boring using heavy steel cable connected to a hydraulic winch. The bore hole may contain casing (steel or plastic pipe), depending upon future use of the boring and the rigidity of the penetrated formation. The split spoon sampler is forced into the soil by dropping a drive weight repeatedly onto the drive head located at the top of the drill rod. Weights up to 350 pounds are available; however, a 140 lb. weight for a 2-inch diameter sampler is most commonly used. The weight is typically allowed to fall a distance of 30 inches for each blow. The sampler is driven through its full length while recording blow counts at 6-inch intervals. Split spoon samplers are manufactured in 18- and 24-inch lengths with 2- to 3-inch outside diameters.

Occasionally bedrock or extremely compacted sediments are encountered which make further advance of the sampler extremely difficult without damage to the sampler. This is known as "refusal" and is defined as a "penetration of less than 1 foot for 100 blows"; a blow refering to striking the drive rod with the drive weight. Six inches for 50 blows is also commonly recognized as refusal. Upon refusal, the bore hole is either advanced past the difficult layer using the auger or the borehole is abandoned.

The procedure for split spoon sampling is as follows:

(1) Fill out sample labels with sample identification and requested analyses.

(2) Note exact location of the sample in the field logbook. If not tied in to a surveyed grid system or some other well documented system, measure distances and direction from stationary landmarks. If possible, photograph the location. If appropriate, spray paint or wooden stakes may also be used to mark the location.

(3) At the time of individual sample collection, record the date, time, and sampler's name/initials on all sample containers and in the field logbook.

(4) After driving a split spoon sample, remove the sampler from the borehole and place on a secure bench or rack for opening.

(5) Separate the two halves of the sample tube (a flat-blade screwdriver is useful), exposing the brass liners if any.

(6) Run a knife between the liners to separate the soil. Immediately seal the cut ends with Teflon film if VOCs analyses are required. Cover the ends with plastic caps ovewrw the Teflon, and wrap with grey duct tape. Apply sample label.

(7) If the samples are being analyzed for VOCs, prepare the VOC liner first so as to minimize volatilization. VOC samples should be tightly packed leaving as little airspace in the liners as possible.

(8) If a composite sample is requuired, periodically place a small amount of soil in a decontaminated stainless steel bucket (e.g. some from each sampling interval) for the length of the borehole. If using brass liners, select the whole or part of one the liners for each sampling interval and place the soil in the bucket. Using a decontaminated stainless steel trowel, mix the soil prior to filling the sample containers.

(9) At each sampling location, decontaminate the outside of the sample containers, bag the samples in a ziplock bag, and place in a cooler. For sample preservation, the cooler should contain ice.

(10) Field duplicates may be collected either by compositing the soil in a decontaminated stainless steel bucket (a composited field duplicate) or sampling from a close adjacent location (a collocated field duplicate). Collocated field duplicates can be collected from adjacent liners within a single split spoon. Follow the site-specific sample plan and document the duplicate collection process in the field logbook.

A similar type of sampling apparatus is the "Shelby" tube. While the split spoon is a multiple piece sampler, the Shelby tube is a single-piece metal tube with thinner gauge metal than the split spoon. Like the split spoon, soil is forced into the Shelby tube by pushing the sampler into the soil at the required depth inside a borehole. Because the Shelby tube has thin walls, a sharp cutting edge, and is pushed (manually, hydraulically, or with a piston) rather than driven, relatively undisturbed samples can be collected. Undisturbed samples are essential for proper consolidation and strength testing analyses.

During sampling, it is important not to overly disturb the soil sample by forcing the tube deeper than its own length. After sampling, the entire Shelby tube is sent to the laboratory with the sample inside. It is important to indicate with a marking pen the top and bottom of the Shelby tube sampler; this is essential for maintaining the physical integrity of the sample. Samples should remain standing "upright" until the samples are extruded in the laboratory for analysis.

3.1.2 HIGH HAZARD LEVEL SAMPLES

High hazard samples are those that contain hazardous substances in concentrations of over 200 ppm. Typically, these samples are pure chemical wastes rather than contaminants in soil or sediment. Knowledge of the anticipated hazardous substance(s) prior to sampling is imperative. The site-specific Health and Safety Plan should document each anticipated chemical; employees should consult this plan to prevent unnecessary danger when handling the samples.

APPENDIX G

ASBESTOS, RESIDUE, AND SUBSURFACE SAMPLING
BUILDINGS 4, 5, 6, 14, 15, 16, AND THE OIL YARD

SITE SAFETY AND HEALTH PLAN

ITT AEROSPACE CONTROLS
BURBANK, CALIFORNIA

Prepared by

ICF KAISER ENGINEERS

AUGUST 1993

APPROVALS, ICF KAISER ENGINEERS

Prepared by:

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Ines Cadavid-Parr, I.H.
Regional Health and Safety Officer

Approved by:

____

Susanne Kraemer, C.E.G.
Project Manager

Timothy S. Perini

Timothy S. Perini
Project Engineer

____

Gerald Joy, C.I.H., C.S.P.
Group Health and Safety Director

SECTION 1

INTRODUCTION

This Site Safety and Health Plan (SSHP) was prepared by ICF Kaiser Engineers (ICF KE) for work to be conducted at the ITT Aerospace Facility. The provisions of this SSHP apply only to ICF KE personnel during the asbestos, residue, and subsurface sampling activities in Buildings 4, 5, 6, 14, 15, 16, and the waste oil yard.

The health and safety guidelines and requirements presented here are based on a review of available information and an evaluation of potential hazards. This plan describes the health and safety procedures and equipment required for activities at this site to minimize the potential for exposures to field personnel. Should circumstances during the course of field work be extraordinarily different than anticipated, field work shall be temporarily stopped, so that potential hazards can be evaluated and appropriate health and safety precautions implemented.

The provisions of this SSHP will be implemented by ICF KE personnel. All subcontractors are responsible for their own health and safety program, however, subcontractors will also comply with the requirements of this SSHP.

SECTION 2

SUMMARY

Project Summary

ICF Kaiser Engineers (ICF KE) has been retained by ITT to collect asbestos, residue, and subsurface samples within and in the vicinity of Buildings 4, 5, 6, 14, 15, 16, and the oil yard at the ITT Burbank site. Both bulk and wipe samples of building materials will be collected to assess the extent of asbestos and chemical contamination in the buildings so that the materials can be properly characterized for disposal during demolition. Materials which are suspected of containing asbestos will be sampled by personnel having the California Occupational Safety and Health Administration (Cal-OSHA) required asbestos training and registration. Because the sampling will take place while the ITT facility is in operation, necessary precautions will be implemented to ensure the safety of all ITT employees.

Other building materials (walls, floors, structural beams, equipment, and loose floor debris) and surface features such as sumps, trenches, tanks, and piping will be sampled to identify areas with potentially hazardous chemical residues. Residue samples will be analyzed primarily for polychlorinated biphenyls (PCBs), total residual petroleum hydrocarbons (TRPH), metals, and volatile organic compounds (VOCs) depending on which chemicals are suspected in a given area.

Subsurface soil and soil-vapor samples will also be collected within and in the vicinity of the buildings. A truck-mounted Geoprobe unit utilizing a percussion hammer will be used to conduct both the soil and soil-vapor sampling as described in the sampling plan. In areas which are inaccessible to the Geoprobe, the subsurface samples will be collected using hand-driven samplers. Coring of the concrete slab will be necessary for subsurface sampling inside the buildings. The soil and soil-vapor samples will be collected to identify potential source areas and to assess the vertical and lateral extent of VOCs, PCBs, and metals within and around the buildings.

The sampling program for Buildings 4, 5, 6, 14, 15, 16, and the oil yard has been divided into three separate tasks: Task 1--Asbestos and Residue sampling; Task 2--Subsurface Soil-Vapor Sampling; and Task 3--Subsurface Soil Sampling. Task 1 will be completed first and is anticipated to last approximately 2 to 3 weeks. Approximately 2-3 qualified personnel will complete Task 1. Tasks 2 and 3 should last approximately 2 weeks and will consist of approximately 2-3 ICF KE personnel and 1-2 subcontractor personnel.

Site Description/History

The ITT facility is located within an industrial/commercial area at 1200 S. Flower Street along the border of Burbank and Glendale, California. The site is entirely fenced in with guarded gates on the east and south sides. The facility has been operating since the 1950s manufacturing and producing instrumentation and control housings and castings. The entire eastern portion of the site, formerly owned by ITT General Controls, ceased operations in 1989; the remaining 4 buildings in this area are currently under demolition. ITT Aerospace Controls presently occupies the western portion of the site, including all the buildings and areas addressed in the sampling plan.

A variety of chemicals have been used at the site for manufacturing processes and other related work. The residual chemicals of most concern for the present sampling plan are PCBs, petroleum hydrocarbons, and metals resulting from passivity plating operations. Due to the detection of solvents such as trichloroethylene (TCE) and trichloroethane (TCA) in previous investigations, some samples will also be screened for VOCs, particularly subsurface samples and samples of sump and trench residues.

SECTION 3

KEY PERSONNEL AND RESPONSIBILITY

Ms. Susanne Kraemer is the Project Manager. Mr. Tim Perini is the Project Engineer. Ms. Ines Cadavid-Parr, is the Regional Health and Safety Officer (RHSO) and will function as the on-site Site Safety Officer (SSO). Gerald Joy is the Group Health and Safety Director (GHSD). Additional staff may include Manley Tom, and Sandy Peterson. All project field staff have completed 40 hours of comprehensive health and safety training which meets the requirements of Title 29 Code of Federal Regulations Part 1910.120 (29 CFR 1910.120) and Title 8 of the California Code of Regulations Section 5192 (8 CCR 5192). Qualified personnel trained for asbestos-related work as required by 29 CFR 1926.58, 40 CFR 763, and 8 CCR 1529 will be present for all asbestos sampling.

The SSO has the authority to monitor and correct health and safety problems as they are encountered on site.

The Project Manager (PM) is responsible for generating, organizing and compiling the site safety and health plan which describes all planned field activities and potential hazards that may be encountered at the site. The PM is also responsible for assuring that adequate training and safety briefing(s) for the project are provided to the project team. The PM will provided a copy of this SSHP to each member of the project field team and subcontractor(s) prior to the beginning of field activities.

The Regional Health and Safety Officer (RHSO) is responsible for developing and coordinating the ICF KE regional health and safety program under the direction of the GHSD. The RHSO is responsible for reviewing and approving the draft SSHP for accuracy and incorporating new information or guidelines which aid the PM or SSO in further definition and control of the potential health and safety hazards associated with the project.

The group Health and Safety Director (GHSD) is responsible for developing and coordinating ICF KE's health and safety program. For specific projects, the GHSD is responsible for reviewing and approving the draft SSHP for accuracy and incorporating new information or guidelines which aid the PM or SSO in further definition and control of the potential health and safety hazards associated with the project.

The Project Engineer (PE) is responsible for ensuring that all sampling and data acquisition are performed in accordance with the work plan and SSHP. Any deviations from the sampling plan should be a result of changes in field conditions encountered and should be well documented in the field notes. The Project Engineer's health and safety responsibilities include:

1. Following the Sampling Plan and SSHP.
2. Reporting to the SSO and PM any unsafe conditions or practices.
3. Reporting to the SSO and PM all facts pertaining to incidents which result in injury or exposure to toxic materials.
4. Reporting to the SSO and PM equipment malfunctions or deficiencies.

The SSO has on-site responsibility for ensuring that all team members, including subcontractors if any, comply with the SSHP. It is the SSO's responsibility to inform the subcontractors and other field personnel of chemical and physical hazards as they become aware of them. Additional SSO responsibilities include:

1. Providing site safety briefing for team members.
2. Updating equipment or procedures to be used on site based on new information gathered during the site investigation.
3. Inspecting all personal protective equipment prior to on-site use.

4. Assisting the PM in documenting compliance with the SSHP by completing the standard ICF forms.
5. Assisting in and evaluating the effectiveness of decontamination procedures for personnel, protective equipment, sampling equipment and containers, and heavy equipment and vehicles.
6. Enforcing the "buddy system" as appropriate for site activities.
7. Posting location and route to the nearest medical facility; arranging for emergency transportation to the nearest medical facility.
8. Posting the telephone numbers of local public emergency services; i.e., police and fire.
9. Posting the OSHA Safety and Health Protection Poster.
10. Stopping operations that threaten the health and safety of the field team or surrounding populace.
11. Entering the exclusion area in emergencies after he/she has notified emergency services.
12. Observing field team members for signs of exposure, stress, or other conditions related to pre-existing physical conditions of team members.
13. Reporting injuries and/or illnesses to the RHSO and GHSD using the accident report form (Attachment B).

The following is a list of the contacts for the project:

PROJECT CONTACTS

NAME	TELEPHONE
Susanne Kraemer ICF Project Manager	(916) 852-3710
Tim Perini ICF Project Engineer	(510) 419-6337
Angelo Bellomo ICF Officer Manager	(818) 509-3123
Ines Cadavid-Parr ICF Regional Health and Safety	(818) 509-3135
Gerald Joy ICF Group Health and Safety Director	(412) 497-2056 office (412) 672-7782 home pager 1-800-759-7243 Enter: 5449709#, Enter phone number including area code, press # Listen to confirm number, press #
Teresa Olmsted, ITT Site Coordinator	(818) 953-2119

SECTION 4

HAZARD ANALYSIS

The potential hazards to personnel working at this site have been identified as asbestos exposure, chemical contamination, working around equipment, and noise and heat stress. Each hazard relative to the potential for exposure is described below.

Asbestos Exposure

Direct reading instruments for asbestos are not available to monitor exposure levels. When doing an asbestos survey, due to the short duration of the project and the number of areas usually sampled, the most feasible exposure control method will usually be personal protective equipment (PPE). The use of engineering or administrative controls must not be overlooked, however. Applicable engineering controls include the use of a wetting agent or encapsulant during sampling and the use of a HEPA-filtered vacuum to contain and recover any material disturbed by the sampling.

The need for personal protective equipment depends upon the condition of the asbestos containing materials (ACM) to be sampled, and upon the general environmental conditions in the sampling area(s). If the anticipated hazards are due to ACM only, PPE may be required if the ACM is significantly damaged or if it has separated from its support. PPE may also be necessary if the sampling activity is likely to damage the ACM.

If hazards are due to the general environmental conditions of the site (i.e., existing process materials), a specific review of those conditions and the hazards associated with them must be made.

Should PPE be necessary, the need for decontamination and disposal must then be addressed. A guideline is that if the ACM is extremely friable and/or large amounts are damaged or dislodged, some level of decontamination and appropriate disposal will be necessary.

Chemical Contamination

Table 4-1 presents general information on the chemicals previously identified at the ITT facility. The information includes exposure limits and recommendations, routes of exposure, typical signs and symptoms of exposure and ionization potentials. The majority of the chemicals listed in Table 4-1 were identified at very low concentrations (low parts per billion).

Previous soil-vapor and soil boring results were dominated by the chlorinated solvents trichloroethylene (TCE), tetrachlorethane (PCE), and 1,1,1-trichloroethane (1,1,1-TCA) (Table 4-2). Polychlorinated biphenyls (PCBs) were identified at elevated levels in Buildings 2 and 8, but are not expected at elevated concentrations in the remaining buildings on site. For the present sampling plan, select areas and materials will be sampled to confirm expected low PCB levels. Metals such as chromium, cadmium, arsenic, and lead have been detected previously in subsurface features such as sumps and trenches. VOCs similar to those identified during subsurface work were also detected in some of these subsurface features.

Personnel protection while sampling for potential chemical residues will be based on direct instrument readings which will screen for the compounds listed in Table 4-2. Initial levels of protection for subsurface sampling activities will be determined according to previous soil and soil-gas chemical data.

Table 4-1

Chemicals Identified On-Site
ITT Facility

Chemical	Exposure Limit	IDLH Level (ppm)	Routes of Exposure	Symptoms of Exposure	Ionization Potential (ev)
Volatile Organic Compounds					
Acetone	PEL/TLV-750ppm REL = 250 ppm	20,000	Inhalation, Ingestion, skin and/or eye contact	Irritates eyes,nose,throat; headache; dizziness; dermatitis	9.69
Bromoform	PEL/TLV = 0.5 ppm	N.A.	Ingestion, inhalation, absorption	Irritates eyes and respiratory systems; central nervous system depression; liver damage	10.48
2-Butanone(MEK)	PEL/TLV = 200 ppm 10-hr.	3,000	Inhalation, ingestion, skin and/or eye contact	Irritates eyes, nose;, headache; dizziness; vomiting	9.54
Carbon tetrachloride	PEL = 2 ppm TLV = 5 ppm	Carcinogen [300]	Inhalation, absorption, ingestion, skin and/or eye contact	Central nervous system depression; nausea, vomiting; liver and kidney damage; skin irritation; [carc.]	11.47
o-Dichlorobenzene	PEL/TLV = 50 ppm	1,000	Inhalation, absorption, ingestion, skin and/or eye contact	Irritates eyes, nose; liver, kidney damage; skin blisters	9.06
p-Dichlorobenzene	PEL/TLV = 75 ppm	Carcinogen [1,000]	Inhalation, ingestion, skin and/or eye contact	Headache; eye irritation, periodically swelling; profuse rhinitis; anorexia, nausea, vomiting; low weight, jaundice, cirrhosis; [carc]	8.98
1,1-Dichloroethane (1,1-DCA)	PEL = 100 ppm TLV = 200 ppm	4,000	Inhalation, ingestion, skin and/or eye contact	Central nervous system depression; skin irritation; liver, kidney damage;	11.06
1,2-Dichloroethylene (1,2-DCE)	PEL/TLV = 200 ppm	4,000	Inhalation, ingestion, skin and/or eye contact	Central nervous system depression; irritates eyes, respiratory system;	9.65

Table 4-1

Chemicals Identified On-Site
ITT Facility

Chemical	Exposure Limit	IDLH Level (ppm)	Routes of Exposure	Symptoms of Exposure	Ionization Potential (ev)
Methylene chloride	TLV = 50 ppm PEL = 500 ppm	Carcinogen [5,000]	Inhalation, ingestion, skin and/or eye contact	Fatigue, weakness, light-headless, sleepiness; limbs numb-tingle; nausea; irritates eyes-skin, [carc]	11.35
Polychlorinated biphenyls (PCBs)	PEL = 1mg/m^3 REL 10-hrTWA = 1 ug/m^3	Carcinogen [10 μg/m^3]	Inhalation, absorption, ingestion, skin and/or eye contact	Irritates eyes; chloracne; liver damage; [carc]	--
Tetrachloroethylene (PCE)	TLV = 50 ppm PEL = 25 ppm	Carcinogen [500]	Inhalation, ingestion, skin and/or eye contact	Irritates eyes-nose-throat, nausea; flush neck-face; vertigo, dizziness, incoordination; headache, somnolence; skin erythremia; liver damage; [carc]	9.32
1,1,2,2-Tetrachloroethane	PEL/TLV = 1 ppm	Carcinogen [150]	Inhalation, ingestion, absorption, skin and/or eye contact	Nausea, vomiting, abdominal pain; tremor fingers; jaundice, enlarged tender liver; dermatitis; monocytosis; kidney damage;	11.10
Trichloroethylene (TCE)	PEL/TLV = 50 ppm REL = 25 ppm	Carcinogen [1,000]	Inhalation, ingestion, skin and/or eye contact	Headache, vertigo; visual disturbance, tremors, somnolence, nausea, vomiting; irritated eyes; dermatitis; cardiac arrhythmias, paresthesia [carc]	9.45
Toluene	PEL/TLV = 100 ppm	2,000	Inhalation, absorption, ingestion, skin and/or eye contact	Fatigue, weakness; confusion, dilated pupils, lacrimation; euphoria, nervousness, muscle fatigue, insomnia; paresthesia; dermatitis; dizziness, headache	8.82

Table 4-1

Chemicals Identified On-Site
ITT Facility

Chemical	Exposure Limit	IDLH Level (ppm)	Routes of Exposure	Symptoms of Exposure	Ionization Potential (ev)
Vinyl Chloride	PEL = 1 ppm TLV = 5 ppm	Carcinogen	Inhalation	Weakness, abdominal pain, GI bleeding, hepatomegaly, pallor or cyanosis of extremities; [carc]	9.99
Chloroform	PEL = 20 ppm TLV = 10 ppm	Carcinogen [1,000]	Inhalation, ingestion, skin and/or eye contact	Dizziness, metal duliness, nausea, disorientation; headache, fatigue, anesthesia, hepatomegaly, eye and skin irritation, [carc]	11.42
1,2-Dichloroethane (1,2-DCA)	PEL = 1 ppm TLV = 10 ppm	Carcinogen [1,000]	Inhalation, ingestion, skin and/or eye contact, absorption	Central nervous system depression, nausea, vomiting, dermatitis, eye irritation corneal opacity, [carc]	11.05
1,1,1-Trichlorethane (1,1,1-TCA)	PEL/TLV = 350 ppm	1,000	Inhalation, ingestion, skin and/or eye contact	Headache, lassitude, central nervous system depression, poor equilibrium; dermatitis; eye irritation; cardiac arrhythmias	11.00
Trichlorofluoromethane (Freon-11 or Fluorotrichloromethane)	PEL/TLV = 1,000 ppm	10,000	Inhalation, ingestion, skin and/or eye contact	Incoordination, tremors, dermatitis; frostbite; cardiac arrhythmias, cardiac arrest	11.77
1,2-Dichloroethene (t-acetylenedichloride, t-dichloroethylene)	PEL/TLV = 200 ppm	4,000	Inhalation, ingestion, skin and/or eye contact	Irritation of eyes and respiratory system; central nervous system depression	9.65
Methyl Isobutyl Ketone (Hexone, MIBK)	PEL/TLV = 50 ppm	3,000	Inhalation, ingestion, skin and/or eye contact	Eye and mucous membra -- irritant; headache; narcosis, coma; dermatitis	9.30
1,1,2-Trichlorotrifluoroethane (Freon 113, TTE)	PEL/TLV = 1,000 ppm	4,500	Inhalation, ingestion, skin and/or eye contact	Irritation of throat; drowsiness; dermatitis	11.99

Table 4-1

Chemicals Identified On-Site
ITT Facility

Chemical	Exposure Limit	IDLH Level (ppm)	Routes of Exposure	Symptoms of Exposure	Ionization Potential (ev)
1,1,2-Trichlorethane (Vinyl trichloride)	PEL/TLV = 10 ppm	Carcinogen [500]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Eye, nose irritation; central nervous system depression; liver and kidney damage; [carc]	11.00
Benzene	PEL = 1 ppm 15-min ceil = 1 ppm REL = 0.1	Carcinogen [3,000]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation of eyes, nose, and respiratory system; giddiness; headache, nausea, staggered gaid; fatigue, anorexia, dermatitis, bone narrow depression; [carc]	9.25
Ethylbenzene (phenylethane)	PEL/TLV = 100 ppm	2,000	Inhalation, ingestion, skin and/or eye contact	Irritation of eyes and mucous membranes; headaches; dermatitis, narcosis, coma	8.76
Xylenes (Dimethylbenzenes)	PEL/TLV = 100 ppm	1,000	Irritation, skin absorption, ingestion, skin and/or eye contact	Dizziness, excitement, drowsiness, incoordination, staggered gait; irritation of eyes, nose and throat; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	8.56
<u>Metals</u>					
Antimony	TLV = 0.5 mg/m^3	80 mg/m^3	Inhalation, contact	Irritated nose-throat-mouth-skin, cough, dizziness, headache, nausea, vomiting, diarrhea, cramps, insomnia, anorexia, loss of smell, cardiac abnormalities	--

Table 4-1

Chemicals Identified On-Site
ITT Facility

Chemical	Exposure Limit	IDLH Level (ppm)	Routes of Exposure	Symptoms of Exposure	Ionization Potential (ev)
Arsenic	TLV = 10 ug/m^3	Carcinogen [100 mg/m^3]	Inhalation, absorption, skin and/or eye contact, ingestion	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, respiratory irritation, hyperpigment of skin [carc]	--
Barium	TLV = 0.5 mg/m^3	1,100 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Upper respiratory irritation, gastroenteritis, muscle spasms, slow pulse, extrasystole; hypokalemia, irritated eyes and skin, skin burn	--
Cadmium	TLV = 0.05 mg/m^3	Carcinogen [50 mg/m^3	Inhalation, ingestion	Pulmonary edema, dyspnea, cough, tight chest, substernal pain, headache, chills, muscle aches, nausea, diarrhea, vomiting, emphysema,proteinuria, anemia [carc]	--
Copper	TLV = 1 mg/m^3	N.A.	Inhalation, ingestion, skin and/or eye contact	Irritates nasal mucous membranes, and pharynx, nasal perforation, eye irritation, metal taste, dermatitis	--
Chromium (assume worst case; carcinogenic hexavalent)	TLV = 0.05 μg/m^3	Carcinogen	Inhalation, ingestion, skin and/or eye contact	Respiratory-nasal septum irritation, leukocytosis, leukopenia, monocytosis, eosinophilia, eye injury, conjunctivitis, skin ulcer and sensitivity	--
Cyanide	PEL/TLV = 5 mg/m^3 REL ceil = 5 mg/m^3	50 mg/m^3	Inhalation, absorption, ingestion, skin and/or eye contact	Asphyxia and death can occur; weakness, headache, confusion; nausea, vomiting; increased rate of respiration; slow gasping respiration, eye-skin irritation	--

Table 4-1

Chemicals Identified On-Site
ITT Facility

Chemical	Exposure Limit	IDLH Level (ppm)	Routes of Exposure	Symptoms of Exposure	Ionization Potential (ev)
Lead	PEL = 0.05 mg/m^3	N.A.	Inhalation, ingestion, skin and/or eye contact	Lassitude, insomnia; pallor; anorexia, low-weight, malnutrition, constipation, abdominal pain, colic; anemia; gingival lead line, tremors, paralysis wrist, ankles; encephalopathy; nephropathy; hypotension; eye irritation	--
Mercury	PEL/TLV = 0.05 mg/m^3	28 mg/m^3	Inhalation, absorption, skin and/or eye contact	Cough, chest pain, dyspnea, bronchial pneumonia; tremor, insomnia; irritability, indecision; headache, fatigue, weakness; stomatitis, salvation, GI disturbances, anorexia, low-weight; proteinuria; irritated eyes-skin	--
Nickel	PEL/TLV = 1 mg/m^3 (metal) = 0.1 mg/m^3 (soluble) REL = 0.015 μG/M^3	Carcinogen	Inhalation, absorption, skin and/or eye contact	Sensitivity dermatitis, allergic asthma, pneumonitis [carc]	--
Silver	PEL/TLV = 0.01 mg/m^3	N.A.	Inhalation, absorption, skin and/or eye contact	Blue-gray eyes-nasal septum-throat-skin;irritated skin, ulcerated skin, GI disturbances	--
Vanadium	PEL/TLV = 0.05 mg/m^3	70 mg/m^3	Inhalation, absorption, skin and/or eye contact	Irritated eyes-throat; green tongue, metal taste; cough; fine rales, wheezing, bronchitis, dyspnea; eczema	--

Table 4-1

Chemicals Identified On-Site
ITT Facility

Chemical	Exposure Limit	IDLH Level (ppm)	Routes of Exposure	Symptoms of Exposure	Ionization Potential (ev)
Zinc (as zinc oxide)	PEL/TLV = 5 mg/m^3	N.A.	Inhalation	Sweet metal taste; dry throat, cough; chill, fever; tight chest, dyspnea, rales, low pulmonary function; headache; blurred vision; muscle cramps,lower back pain; nausea, vomiting, fatigue, lassitude, malaise	

Table 4-2

Summary of Chemicals Most Frequently Encountered

	Maximum Source Soil Boring	Concentration (ppm) Soil-gas	Exposure Limit (ppm)	IDLH (ppm)	Monitoring Device
Trichloroethene (TCE)	40	4.9	PEL/TLV = 50	Ca [1,000]	HNu
Tetrachlorethene (PCE)	36	0.6	PEL = 25	Ca [500]	HNu
1,1,1-Trichloroethane (1,1,1-TCA)	40	6.1	PEL/TLV = 350	1,000	HNu
1,1-Dichloroethane (1,1-DCA)	--	0.6	PEL = 100	4,000	HNu
Dichloroethene (DCE)	0.3	0.8	TLV = 200	4,000	HNu

Tables taken from previous data prepared by Roy F. Weston.

Working Around Equipment

Electrical power lines above and below ground will be identified at the site prior to the start of any Geoprobe sampling activities to prevent electrocution. Personnel will be aware of the movement of the Geoprobe rig at all times.

Noise

Noise levels in some of the ITT buildings and around the Geoprobe truck during subsurface sampling may exceed a comfortable range. Ear plugs are recommended for these situations. In the event that levels reach 85 dBA, then hearing protection will be required.

Sunburn

Working outdoors on sunny days for extended periods of time can cause sunburn to the skin. Excessive exposure to sunlight is associated with the development of skin cancer. Field staff should take precautions to prevent sunburn by using sun-screen lotion of SPF 15 or greater and/or wearing hats and long-sleeved garments.

Heat Stress

The potential for heat stress is a concern when field activities are performed on warm, sunny days, and is accentuated when chemical protective clothing is worn. Heat stress prevention measures and monitoring will be implemented if site temperatures are above 70 degrees Fahrenheit.

Precautions to prevent heat stress will include work/rest cycles so that rest periods are taken before excessive fatigue occurs, and regular intake of water to replace what is lost from sweating. Work/rest cycles will be established based on monitoring the heart rate (pulse) of each individual worker. Rest breaks will be long enough to reduce the heart rate (HR) below levels calculated according to the following method.

1. The worker will initially determine their resting HR prior to starting work activities.

2. At the start of the first rest period, the worker will determine their HR. This initial HR should not exceed the individual's age-adjusted maximum HR, which equals [(0.7)(220 - age in years)]. At 1 minute into the rest period, the recovery HR will be determined. The recovery HR should not exceed 110 beats per minute.

3. If the initial HR exceeds the age-adjusted maximum HR, or the 1-minute recovery HR is greater than 110 beats per minute, then the next work period will be decreased by 10 minutes.

Heat stress due to water loss can be prevented. To prevent dehydration, water intake must approximate sweat loss. Water intake guidelines are as follows:

1. The sense of thirst is not an adequate regulator of water replacement needs during heat exposure. Therefore, water must be replaced at prescribed intervals.
    a. Before work begins, drink two 8-ounce glasses of water.
    b. During each rest period, drink at least two 8-ounce glasses of water.

2. Plain water, served cool, is excellent. An adequate supply of potable water and drinking cups will be readily available, such as in a support vehicle, to provide water during rest periods.

3. Adding salt to water is not recommended. However, other fluids, in addition water, could include dilute fruit juices and electrolyte replacement drinks diluted 3:1 with water. DO NOT use salt tablets!

An initial work/rest cycle of one hour work and fifteen minutes rest is recommended for protection of the staff when the heat stress hazard is high. The recommended cycle will be adjusted up or down based upon worker monitoring, environmental conditions, and the judgement of the site safety officer. At any time field team members recognize the signs or symptoms of heat stress prior to a scheduled rest period, they will notify the SSO immediately in order that a rest period can be called.

Heat stress, if not prevented, results in heat stress illnesses. Two critical illnesses, if not recognized and treated immediately, can become life threatening. These are heat exhaustion and heat stroke. Heat exhaustion will result if the prevention measures described above are not implemented. Ignoring the signs and symptoms of heat exhaustion will lead to the development of heat stroke.

Heat stroke is an immediate, life-threatening condition that results because the body's heat regulating mechanisms shut down , and the body cannot cool itself sufficiently. As excessive heat is stored in the body, brain damage can result causing permanent disability or death.

Heat Exhaustion

The signs and symptoms of heat exhaustion are headache; dizziness; nausea; weakness; fainting; profuse sweating; loss of appetite; approximately normal body temperature; dilated pupils; weak and rapid pulse; shallow and rapid breathing; possible cramps in abdomen and extremities; difficulty walking; cool and sweaty skin to the touch; pale to ashen gray coloring.

First aid for heat exhaustion is as follows:

1. Immediately remove the victim to the support area, or if you are the victim, proceed to the support area.
2. Decontaminate, if practical, before entering support area.
3. Start cooling, but be careful not to cause a chill (i.e., rest in the shade and apply a wet towel to the forehead; open up and/or remove clothing as much as practical, especially chemical-resistant clothing.)
4. Drink cool water slowly, but only if conscious, and not in shock.
5. If vomiting, and/or the signs and symptoms are not lessening within an hour, call for emergency help and/or transport the victim to the emergency room.
6. It is likely that a heat exhaustion victim will be unable to work for the remainder of the day.

Heat Stroke (aka Sun Stroke)

The signs and symptoms of heat stroke are hot, dry skin to the touch; reddish coloring; body temperature >105 F; no sweating; mental confusion; deep, rapid breathing that sounds like snoring progressing to shallow, weak breathing; headache; dizziness; nausea; vomiting; weakness; dry mouth; convulsions, muscular twitching, sudden collapse; possible unconsciousness.

First aid for heat stroke is as follows:

1. Immediately remove the victim to the support area; prior to entering the support area, remove and dispose of the victim's chemical-resistant clothing.

2. Cool the victim rapidly using whatever means are available, including: shade; opening up and/or removing clothing; soaking clothing/skin with water and fanning; placing the victim in vehicle using air conditioning on maximum.

3. Do not give drinking water to the victim.

4. Treat for shock, if needed.

5. Transport the victim to the emergency room or call for emergency help; no exceptions for heat stroke victim.

Heat stress will be monitored for all ICF KE employee according to the Heat Stress Monitoring Program shown as Attachment A. This monitoring program is intended to establish guidelines to protect all employees from the effects of heat stress (hyperthermia) when working in hot environments.

SECTION 5

TRAINING REQUIREMENTS

All ICF KE staff working on site have completed training in hazard recognition and basic health and safety issues as required by the occupational safety and health regulations contained in 29 CFR 1910.120 (e). Also, any employee conducting asbestos sampling will have completed 24 hours of comprehensive asbestos training as specified in 29 CFR 1926.58, 40 CFR 763, and 8 CCR 1529. In addition, each employee will be familiar with the requirements of this site safety and health plan, and will participate in site activity and safety briefings. The SSO will document all site safety activity and implementation of this plan.

The following lists the training and compliance status of field personnel working on this project.

HEALTH AND SAFETY COMPLIANCE STATUS FOR PERSONNEL INVOLVED IN FIELD ACTIVITIES

NAME	MEDICAL CURRENT	FIT TEST CURRENT	CERTIFICATION LEVEL A B C D	TRAINING CURRENT			
				40 HR	8 HR	CPR	ASBESTOS
Susanne Kraemer, PM	YES	YES	B	X	X	X	
Ines Cadavid-Parr,SSO	YES	YES	B, SUP	X	X	X	X
Tim Perini, Project Engineer	YES	YES	B,	X	X	X	
Manley Tom	YES	YES	B, SUP	X	X	X	

SECTION 6

PERSONAL PROTECTIVE EQUIPMENT

Based on the hazard analysis for this project, the following personal protective equipment (PPE) will be required and used. Changes to these specified items of PPE will not be made without the approval of the site safety officer.

During sampling, the minimum required level of personal protection at the site at all times is Level D. Level D consists of hard hat, steel-toed boots, safety glasses, long pants and shirt with sleeves. Contact lenses will not be permitted on the site. Eye glasses must be ANSI approved (safety glasses). Monitoring of dust will be conducted both visually and through the use of a dust monitor during all sampling. In addition, dust suppression measures will be used (i.e. spraying with water) during all sampling. If dust levels are harmful, appropriate respirators will be used (Level C protection). Tyveks will also be worn if dust levels are appreciable.

If Level C protection is required, it will consist of Level D protection, plus Tyvek coveralls, Nitrile gloves and liners, chemical-resistant bootcovers, and respirators with combination organic vapor/acid-gas high efficiency filter cartridges. If at any time throughout the course of this job, there is a potential for increased exposure to the personnel, the appropriate personal protective equipment will be required.

For all asbestos sampling a minimum of Level C protection is required. PPE will consist of the Level C protection listed above, with high efficiency cartridges and coveralls approved for use in asbestos contaminated atmospheres.

All field personnel in the immediate work area, must have on-hand, an air-purifying respirator for which they have been satisfactorily fit-tested. Field personnel are not permitted to have facial hair and/or beards which would interfere with the proper sealing of the respirators.

SECTION 7

ENVIRONMENTAL MONITORING PLAN

The potential hazards identified in the hazard analysis portion of this plan require initial and/or on-going monitoring to assess of exposure to the hazards as follows.

PCBs cannot be detected using the monitoring instruments typically used in the field due to their low vapor pressure. Exposure to PCBs generally occurs via inhalation of dust therefore, dust suppression measures will be implemented during sampling and a dust monitor will be used to measure the dust in the work area. Dust supression will also be used for the sampling of asbestos and metals as suspected due to the potential for inhalation. For sampling of potentially friable asbestos, respirators will be used in addition to the dust supression techniques.

Due to the presence of VOCs in the subsurface and in features such as sumps and trenches, direct-reading instruments will be used to monitor air quality in and around the work areas. An Organic Vapor Analyzer (OVA) or a HNu with an 11.7 eV lamp will be used to monitor the breathing zone. The OVA and the HNu measure the total organic vapors present in the sampled air. For health and safety purposes, total organic vapors detected will generally be used to confirm the selection of protective equipment. The OVA is calibrated for VOCs using methane as the standard. The HNu is calibrated using isobutylene as the standard. Instruments used will be calibrated daily prior to the start of field activities to ensure greater accuracy. The OVA and/or HNu will be used to detect VOCs during all subsurface work and during sampling of trenches and sumps.

Dust will be monitored during sampling activities. If dust suppression measures used are ineffective, Level C PPE will be required. The action level for level C based on the dust monitor is 0.5 mg/m^3.

Air monitoring for background levels of air contamination will be performed prior to the start of sampling activities. If at any time the HNu and/or the OVA readings indicate a concentration greater than 5 to 10 ppm above the background levels, full-face air-purifying respirators (APRs) will be worn by all personnel at that work location. If instrument readings rise past 10 ppm above background levels, sampling activities will be discontinued until the work area has been assessed and levels of protection have been upgraded accordingly.

Action Levels

<u>OVA/HNu</u>

1 - 10 ppm above background in the breathing zone	Level C
Above 10 ppm	Level B

<u>Mini-Ram Dust Monitor</u>

Above 0.5 mg/m^3	Level C

Heat stress will be monitored as discussed in the hazard analysis portion of this SSHP.

The following is a list of equipment that must be available during the proposed sampling:

Personal Protective Equipment

Hart Hat
Air-Purifying Respirator (MSA Ultratwin)
Cartridges (MSA) - Organic Vapor/Acid Gas High Efficiency Type GMA-H and HEPA filters for asbestos work
Nitrile Gloves
Latex Gloves
Safety Glasses
Steel Toe Boots
Silver Shield and Liner Gloves
Hearing Protection
Protective Bootcovers
Tyvek

Vehicle Equipment

First-Aid Kit
Cellular Phone or other means of communication
Water (deionized and drinking)
Jumper Cables
Spare tire
Fire extinguisher
Eye wash

Monitoring Equipment

Organic Vapor Analyzer-Flame Ionization Detector (FID) with calibration gas
Photoionization Detector (PID) with calibration gas 11.7 eV lamp or OVA

Mini-Ram Dust Meter
Draeger Pump and colorimetric associated tubes for solvents such as TCE and TCA
Appropriate Calibration Gases (isobutylene, methane)
Thermometer (Oral disposable for heat stress monitoring)

Decontamination Equipment

Tubs
Deionized water
Detergent (biodegradable)
Brushes
Sprayer (also use for dust suppression)
Disposable towels
Drum liners or plastic trash bags

SECTION 8

MEDICAL SURVEILLANCE REQUIREMENTS

Medical surveillance is conducted as a routine program which meets the requirements of 29 CFR 1910.120(f). There will not be any special tests or examinations required for staff involved in this project.

SECTION 9

SITE CONTROL MEASURES

The potential chemical and physical hazards have been identified in this SSHP; however, should site-specific or unexpected conditions arise, the SSO will stop all work at the site and the Project Manager will be notified. Work will not be completed until the SSHP has been revised or re-evaluated accordingly.

Formal work zones will be established prior to the commencement of field activities. Break or eating areas shall be located away from the work zone. Also, a decontamination station will be established if necessary. The work site shall be secured and cleaned at the end of the work day. Communication between the field team members will consist of verbal communication and hand signals.

Because the sampling will take place while the ITT buildings are still operational, ICF KE personnel will take great care to ensure the safety of all ITT employees. ICF KE will notify ITT when sampling will take place in a given area. The SSHP will be made available to all ITT employees. Areas to be sampled for asbestos and residues will be properly barricaded, and measures to control dust generation will be implemented. If dust generation is high or VOC levels require level C personal protection, ICF KE will arrange with ITT to clear their employees of the work area. If need be, sampling will be completed during off hours or at night. Areas where there is sampling of friable asbestos will be isolated from ITT work area, and measures such as misting with water will be used to suppress dust. If isolation is not feasible, ICF KE will conduct the friable asbestos sampling during off hours.

Work Practices

Safe work practices for this project include:

1. Set up, assemble, and check out all equipment for integrity and proper function before entering the restricted work area and prior to starting work activities.
2. Do not use faulty or suspect equipment.
3. Use only new and intact protective clothing. Change the suit, gloves, etc. if they tear.
4. Do not use hands to wipe sweat away from face. Use a clean towel or paper towels.
5. Practice contamination avoidance at all times.
6. Do not smoke, chew tobacco or gum, eat, drink or apply cosmetics while in the exclusion area.
7. Wash hands, face, and arms as soon as possible upon exiting from the exclusion area, and prior to taking rest breaks, lunch break, and leaving the site at the end of the work day.
8. Check in and out with the SSO upon arrival and departure.
9. Perform decontamination procedures completely as required by this SSHP.
10. Notify the SSO immediately if there is an accident that causes an injury or illness.

SECTION 10

DECONTAMINATION

If necessary, decontamination will take place at a designated decontamination area on site. A decontamination station will be set up including at least two 5-gallon buckets; one filled with a clean water and soap mixture and the other with clean water. All workers, PPE, sampling equipment, and heavy equipment leaving the work area will be decontaminated to prevent the spread of hazardous materials. All workers will wash their hands, arms and face after removing PPE and prior to leaving the site. Disposable items will be bagged for disposal along with other hazardous wastes removed from the property. Sampling equipment will be decontaminated using laboratory grade detergent, rinsed with tap water, then rinsed with deionized water before reuse. Support vehicles are to be left outside the exclusion area so that decontamination will not be necessary. All equipment which comes in contact with soils potentially containing PCBs or other chemicals will be steam- cleaned prior to removal from site. There are no special emergency decontamination procedures anticipated for this project.

Decontamination water, if any, will be contained, sampled, and properly disposed of according to applicable local, state, and federal regulations.

SECTION 11

EMERGENCY PROCEDURES

In the event of an emergency on site, the SSO will direct the course of action, and other on-site personnel will provide assistance. The SSO will call for emergency assistance if needed. In the event of an emergency, the SSO will contact the Project Manager and the Health and Safety Officer as soon as is practical. All staff assigned to this project will be briefed on the procedures and responsibilities for implementation. In the event of a medical emergency, 911 should be used. ICF KE personnel will also become familiar with ITT emergency procedures.

The SSO is trained in first-aid and CPR. A first-aid kit and fire extinguisher will be readily available. The nearest telephone will be identified prior to beginning field activities. The emergency telephone numbers to be used for assistance are listed below. A copy of this list will be posted in the support zone of the work area.

If an injury occurs during the project, an Injury Report Form (Attachment B) should be filled out and submitted to the HSO. All injury reports will be kept in the project files.

The following emergency telephone numbers will be used to call for assistance:

EMERGENCY CONTACTS

NAME	TELEPHONE
Susanne Kraemer ICF Project Manager	(916) 852-3710
Timothy Perini ICF Project Engineer	(818) 509-3195
Ines Cadavid-Parr ICF Regional Health and Safety	(818) 509-3135
Gerald Joy ICF Group Health and Safety Director	(412) 497-2056 office (412) 672-7782 home pager 1-800 - 759-7243 enter 5449709# enter phone number including area code, press # listen to confirm number, press #
Angelo Bellomo Office Manager	(818) 509-3123
Teresa Olmsted Site Coordinator, ITT	(818) 953-2119
St. Joseph Medical Center	(818) 843-5111
Police/Fire/Paramedics	911
EPA-Emergency Response Team	(201) 321-6660
Poison Control Center	(800) 962-1253
National Pesticide Center	(800) 845-7633

NAME	TELEPHONE
Center for Disease Control	(404) 329-3311 (404) 329-3644 (pm)
Environmental Emergency National Response Center	(800) 424-8802
Directions to the nearest hospital: St. Joseph Medical Center 2727 Alameda Avenue Burbank, CA	Proceed 1/4 mile northeast on Flower Street to Alameda Avenue. Turn left on Alameda for approximately 2 miles to Buena Vista Street. Hospital is on the corner of Alameda and Buena Vista (Figure 1).

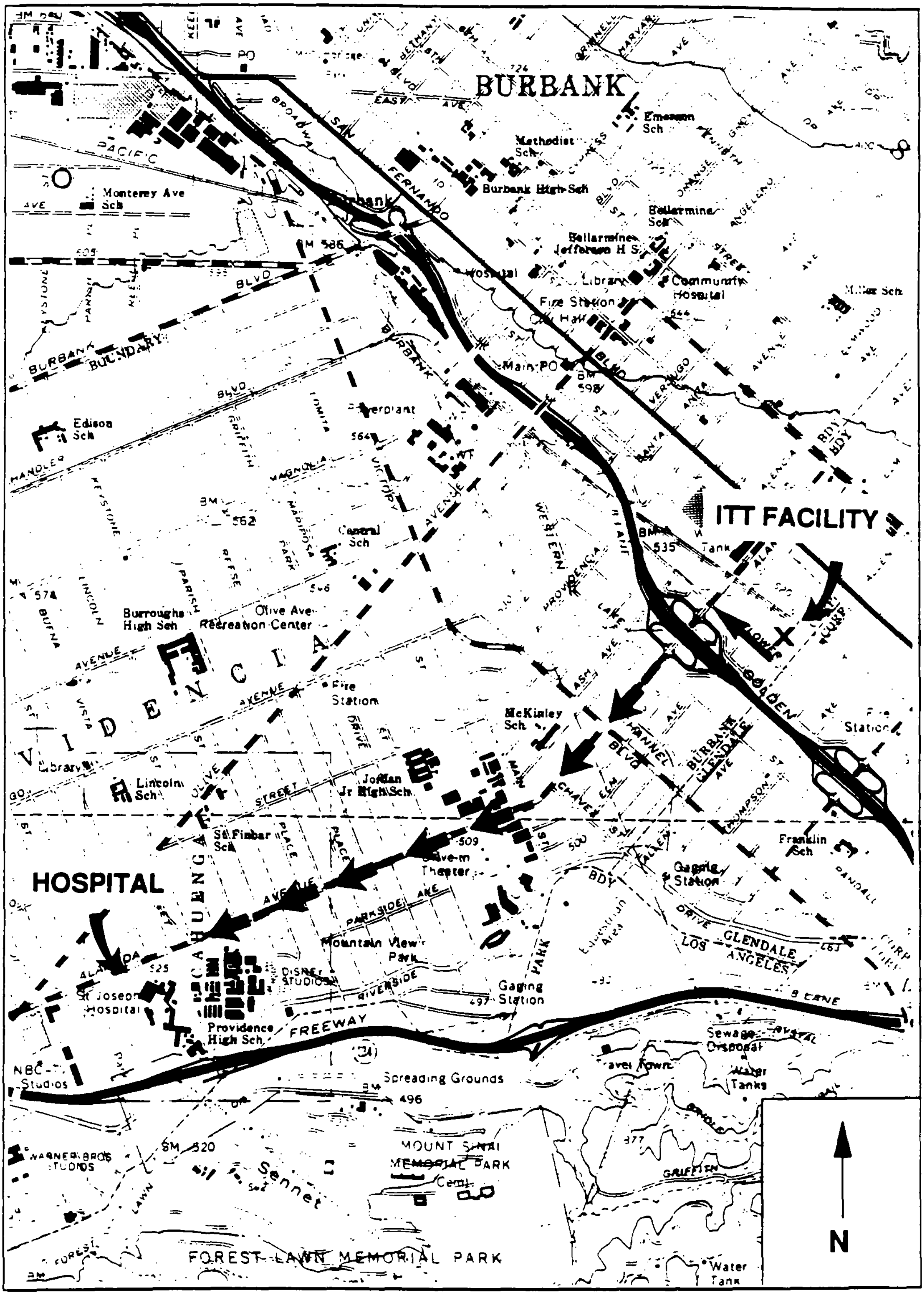

Figure 1: Location of Site and Nearest Hospital

SECTION 12

DOCUMENTATION

The implementation of the site safety and health plan must be documented to assure employee participation and protection. In addition, the regulatory requirements must be met for record keeping on training, medical surveillance, injuries and illnesses, exposure monitoring, health risk information, and respirator fit-tests. Documentation of each employee's activities is maintained by the Health and Safety Officer in Universal City, California.

Documentation of the implementation of this plan will be accomplished using Attachments C and D.

ATTACHMENT A

HEAT STRESS MONITORING DOCUMENTATION

HEAT STRESS MONITORING PROGRAM

ICF KAISER ENGINEERS　　　DATE: __________

ENVIRONMENT GROUP　　　APPROVED BY: __________

PROCEDURE HS401 - HEAT STRESS

I. PURPOSE

To establish guidelines to protect all employees from the effects of heat stress (hyperthermia) when working in hot environments.

II. REFERENCES

A. Threshold Limit Values and Biological Exposure Indices for 1985/1986, American Conference of Governmental Industrial Hygienists.

B. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/EPA, Health and Human Services, Public Health Service, Center for Disease Control, NIOSH.

C. Criteria for a Recommended Standard, Occupational Exposure to Hot Environments, Revised Criteria 1986, U.S. Department of Health and Human Services, Public Health Service, Center for Disease Control, NIOSH.

III. ATTACHMENTS

1. Recommended Heat-Stress Guidelines for **Unacclimated** Workers in Hot Environments.
2. Recommended Heat-Stress Guidelines for **Acclimated** Workers in Hot Environments.
3. Assessment of Employee Workload (kcal/h) in Hot Environments.
4. Employee Physiological Monitoring Record for Heat Stress (Guideline).

IV. DISCUSSION

Adverse climatic conditions are important considerations in planning and conducting site operations. High ambient temperature can result in health effects ranging from transient heat fatigue, physical discomfort, reduced efficiency, personal injury, increased accident probability, etc. to serious illness or death. **Heat stress is of particular concern when chemical protective garments are worn, since these garments prevent evaporative body cooling. Wearing personal protective equipment puts a worker at considerable risk of developing heat stress.**

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at sites, regular monitoring and other preventive precautions are vital.

Note: Chemical protective clothing is defined as, but not limited to:
Uncoated Tyvek coveralls
Polyethylene coated Tyvek coveralls
Saranex coated Tyvek coveralls
Medium weight polyvinylchloride (PVC) coveralls
Sigel suits (heavyweight PVC) and fully encapsulating suits.

V. ASSIGNMENT OF RESPONSIBILITIES

A. Site H&S Officer

The Site H&S Officer will be responsible for initial on-site coordination of the heat stress policy. He/she shall establish work/rest regimens from the Wet Bulb Globe Thermometer (WBGT) readings and conduct physiological monitoring when on site.

B. Project Manager

The Project Manager will be responsible for field implementation of the heat stress policy. This includes assurance that all personnel on-site comply with the policy. He/she shall be responsible for establishing and monitoring safe work practices. He/she will ensure that all personnel potentially exposed to heat have proper training and that on-site supervision implements the program in his/her absence.

C. Project Supervisor

The Project Supervisor will be responsible for ensuring that work crews comply with all site requirements, including the heat stress policy. In the absence of the Site H&S Officer, he/she shall also be responsible for physiological monitoring as outlined in Section VI below and Guideline Attachment 1 to this procedure. Team members shall also observe their fellow workers for signs of heat stress.

D. Team Member

All Team Members will be responsible for understanding and complying with all site requirements, including the heat stress policy.

VI. PROCEDURES

A. Recommended Guidelines

1. Note that the following guidelines discussed in this section (VI.A.) are only intended to be used as a means for initial establishment of a work-rest regimen. It will be the responsibility of the site health and safety officer to evaluate the conditions at a specific operation and make final determinations of the work-rest regimen. Physiological monitoring, as discussed in the following section, will be used to establish more stringent regimens.

2. Unacclimatized Workers - The total heat exposure to unacclimatized workers not wearing protective clothing shall not exceed the guidelines given in Attachment 1. Note that it generally takes an employee seven to ten days to become acclimated to heat.

3. Acclimatized Workers - The total heat exposure to acclimatized healthy workers not wearing protective clothing shall not exceed the guidelines given in Attachment 2.

4. The guidelines shown in Attachments 1 and 2 are for the worker not wearing chemical protective clothing. If the worker is wearing chemical protective clothing, the guidelines in Attachments 1 and 2 should be changed by 4°F. In other words, add 4°F to the WBGT *reading and use this adjusted* WBGT *in* Attachments 1 and 2.

5. The metabolic heat rate to use in Attachments 1 and 2 shall be estimated using Attachment 3.

B. Physiological Monitoring

1. For operations at which workers are wearing chemical protective clothing, physiological monitoring is necessary when the ambient temperature exceeds 78°F (25.5°C).

2. After the initial work/rest regimen is established, as discussed in Section A, it is necessary to perform physiological monitoring to determine if the established work/rest regimen should be adjusted. The following guidelines will be used to adjust the regimen and should be recorded on a form similar to the guideline attachment 1 to this procedure.

a. Baseline Information

Determine a baseline heart rate and oral temperature for each employee prior to on-site activities by counting the radial pulse and using a clinical thermometer to measure oral temperature.

b. Increasing Work Rate

(1) If a worker's heart rate and oral temperature do not increase, or only increase slightly (10% or less for the heart rate and 0.5° or less for the oral temperature) from the baseline readings after the first work cycle, the work period (according to the established work-rest regimen) can be increased by 20%.

(2) The worker shall be monitored closely after the next work cycle period and if there are still no significant increases in heart rate and oral temperature, the work period can be increased by an additional 10% and the rest period remains the same.

(3) Increases in the work period can be made throughout the shift if there are no significant increases in the physiological monitoring indices.

(4) Note that the increases to the work period are made based on the work-rest regimen established from WBGT readings. These WBGT readings will change throughout the day as the temperature rises or falls.

c. Decreasing Work Rate

(1) Pulse

(a) Count the radial pulse as early as possible in the rest period.

(b) If a worker's heart rate exceeds 110 beats per minute immediately after a work period, shorten the next work cycle by 30% and keep the rest period the same.

(c) If the heart rate still exceeds the 110 beats per minute after the next work period, shorten the following work cycle by 30%.

(d) Continue to shorten the employee's work cycle until the heart beat is below 110 beats per minute.

(2) Temperature

(a) Use a clinical thermometer or similar device to measure the oral temperature at the end of a work period (before drinking).

(b) If the oral temperature exceeds 99.6°F (37.6°), shorten the next work cycle by 30% without changing the rest period.

(c) If the oral temperature still exceeds 99.6°F at the beginning of the next rest period, shorten the following work cycle by 30%.

(d) Do not permit a worker to return to a work area when the oral temperature exceeds 100.6°F (38.10°C).

C. Prevention

1. Establish a work-rest regimen according to the guidelines given in Section A and B of this policy.

2. Adequate liquids must be provided to replace lost body fluids. Employees must replace water and salt lost from sweating. Employees must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.

   Replacement fluids can be a 0.1% salt water solution, a commercial mix, such as Gatorade or Quik Kick, or a combination of these with fresh water. Employees should be encouraged to salt their foods more heavily.

   The replacement fluid temperature should be kept cool.

3. Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments. If cooling devices are worn, only physiological monitoring will be used to determine work activity.

4. All breaks are to be taken in a cool , shaded rest area.

5. Employees shall open or remove chemical protective garments during rest periods.

6. Employees shall not be assigned other tasks during rest periods.

7. All employees shall be informed of the importance of adequate rest and proper diet in the prevention of heat stress.

8. Employees shall be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.

D. Training

Those personnel (including contractor employees) potentially exposed to heat stress conditions shall have the following training:

1. Employees

   a. Sources of heat stress, influence of protective clothing, and importance of acclimatization;

   b. How the body handles heat;

   c. Heat related illnesses;

   d. Preventative/Corrective measures; and

   e. First Aid procedures.

2. ICF KE Supervisors

   a. Measurement methods and calculations of WBGT and physiological monitoring.

ASSESSMENT OF EMPLOYEE WORK LOAD IN HOT ENVIRONMENTS

A.	BODY POSITION AND MOVEMENT		kcal/hr
	Sitting		18
	Standing		36
	Walking		120-180
	Walking Uphill		add 48 per meter rise

B.	TYPE OF WORK	Average kcal/hr	Range kcal/hr
	Hand work		
	Light	24	12-72
	Heavy	54	
	Work One Arm		
	Light	60	42-150
	Heavy	108	
	Work Both Arms		
	Light	90	60-210
	Heavy	150	
	Work Whole Body		
	Light	210	150-540
	Moderate	300	
	Heavy	420	
	Very Heavy	540	

C.	BASAL METABOLISM	60

D.	SAMPLE CALCULATION	Average kcal/min
	Assembling work with heavy hand tools	
1.	Standing	36
2.	Two-arm work	210
3.	Basal Metabolism	60
	Total	306 kcal/hr

EMPLOYEE PHYSIOLOGICAL MONITORING RECORD FOR HEAT STRESS

Employee Name	______	Date	______	Employee SS#	______
BU #	______	Start Time	______	Locations	______
Completed by	______	Stop Time	______	Project Number	______

Temperatures

A. INITIAL READING
1. Ambient Air Temperature ______
2. Baseline Oral Temperature ______
3. WBGT ______

B. AFTER FIRST WORK PERIOD
1. Ambient Air Temperature ______
2. Baseline Oral Temperature ______
3. WBGT ______

C. AFTER SECOND WORK PERIOD
1. Ambient Air Temperature ______
2. Baseline Oral Temperature ______
3. WBGT ______

D. AFTER THIRD WORK PERIOD
1. Ambient Air Temperature ______
2. Baseline Oral Temperature ______
3. WBGT ______

E. AFTER FOURTH WORK PERIOD
1. Ambient Air Temperature ______
2. Baseline Oral Temperature ______
3. WBGT ______

F. AFTER FIFTH WORK PERIOD
1. Ambient Air Temperature ______
2. Baseline Oral Temperature ______
3. WBGT ______

Heart Rate

A. INITIAL RATE
1. Baseline Heart Rate ______ B/min

B. AFTER FIRST WORK PERIOD
1. Baseline Heart Rate ______ B/min

C. AFTER SECOND WORK PERIOD
1. Baseline Heart Rate ______ B/min

D. AFTER THIRD WORK PERIOD
1. Baseline Heart Rate ______ B/min

E. AFTER FOURTH WORK PERIOD
1. Baseline Heart Rate ______ B/min

F. AFTER FIFTH WORK PERIOD
1. Baseline Heart Rate ______ B/min

This completed form should be retained in project file

B/min = Beats/per minute

ATTACHMENT B

ICF KAISER ENGINEERS

INJURY REPORT FORM

ICF KAISER ENGINEERS

CONFIDENTIAL

H&S FILE # ______________

SUPERVISOR'S INJURY/INCIDENT REPORT

This is an official document to be initiated by the employee's supervisor. Please answer all questions completely. This report must be forwarded to the Group Health and Safety office within 24 hours of the injury or incident.

Injured's Name ______________________________ Sex ________ S.S. No. ______________ Birthdate __________

Home Address ________________________ City _____________ State __________ Zip _____ Phone __________

Job Title ______________________ Employee's P.C. ____________ Hire Date ___________ Hourly Wage _________

SUPERVISOR

Date of incident ____________ Time __________ Time reported __________ To Whom? ___________________

Client name _______________________ Client address __________________________ Time shift began ________

Exact location of incident ______________________ Did employee leave work? ___ No ___ Yes When ____________

Has employee returned to work? ____ No ____ Yes When ____

Did employee miss a regularly scheduled shift after the day of the incident? ____ No ____ Yes

Nature of injury ________________________________ Exact body part _______________________________

Medical Attention: _____ None _____ First aid on site _____ Doctor's office _____ Hospital ER _____ Hospitalized

Job assignment at time of incident ____________________ Project __________________ Task ______ Subtask ______

Describe incident ____

____

What unsafe physical condition or unsafe act caused the incident? ______________________________________

____

What corrective action has been taken to prevent recurrence? ____

____

____

Supervisor ___________________________ ___________________________ ___________________________

(Print) Signature Date

MANAGER

Comments on incident and corrective action ____

____

____

Manager's name ___________________________ ___________________________ ___________________________

(Print) Signature Date

HEALTH AND SAFETY

Concur with action taken? ___ No ____ Yes Remarks ____

____

____

OSHA Classification:

___ Incident only ___ First aid ____ No lost workdays ____ Lost workdays ____ Restricted activity ____ Fatality

Days away from work ________ Days restricted work ________ Total days charged ________

Coding: A. Injury type or illness ___ B. Injured body parts ___ C. Activity at time of accident ___ D. Injury cause code ___

E. Agent code ___ F. Safety rule violated code ___ G. Accident prevention code ___

Name ___________________________ ___________________________ ___________________________

(Print) Signature Date

White: Group Health and Safety Yellow: Corporate Insurance Pink: Business Unit Manager

hs79 CC: General Counsel's Office if accident involves death, serious injury or substantial property damage.

ICF KAISER ENGINEERS

VEHICLE ACCIDENT REPORT

Complete this form within 24 hours of the accident. Include all available information.

ICF KE VEHICLE

DRIVER ______________ ACCIDENT DATE ____________ DRIVER'S LICENSE ____________ STATE ______
ADDRESS ____
CITY ______________________________ STATE ____________ ZIP ____________
WORK PHONE (   ) ______________ SS# ______________ BU# ____________
VEHICLE # __________ YEAR __________ MAKE __________ MODEL __________ PLATE ________
STATE __________ VEHICLE OWNER: ________ ICF KE ________ LEASED/RENTED ________ PRIVATE VEHICLE
IF NOT ICF KE OWNED: OWNER ______________________________________
ADDRESS ______________________________________ PHONE ____________
VEHICLE DAMAGE ______________________ EST. REPAIR COST ______________

____

OTHER VEHICLES(S)
USE SEPARATE SHEET IF MORE THAN ONE

DRIVER ______________ DRIVERS LICENSE ______________ STATE ____________
ADDRESS ____
CITY ______________ STATE ______________ ZIP ____________
PHONE (   ) ______________ SS# ______________
OWNER'S NAME (CHECK IF SAME AS DRIVER ___) ______________________________
ADDRESS ____
CITY ______________ STATE ______________ ZIP ____________
INSURANCE COMPANY ______________________ POLICY # ______________
AGENTS NAME ______________ ADDRESS ______________ PHONE # ____________
VEHICLE: YEAR ________ MAKE ________ MODEL ________ PLATE # ____________ STATE ________
VEHICLE DAMAGE ____
PASSENGERS ________ YES ________ NO
INJURIES ________ YES (LIST NAMES & ADDRESS ON REVERSE, ALSO COMPLETE AN SIIR IF ICF KE EMPLOYEE)
________ NO

ACCIDENT DESCRIPTION (Use back if needed)

DATE ______________ TIME ______________ WEATHER ______________
LOCATION ____
DESCRIPTION ____
____
____
____
WITNESS ______________________ ADDRESS ______________________
____ PHONE # ____________
POLICE OFFICER'S NAME ______________________ DEPT. ______________
REPORT PREPARED BY ______________________ DATE ______________

MANAGER ____

White: Group Health and Safety   Yellow: Business Unit Manager

hs79

ATTACHMENT C

ICF KAISER ENGINEERS

SITE SAFETY AND HEALTH PLAN
EMPLOYEE ACKNOWLEDGEMENT

SITE SAFETY AND HEALTH PLAN
EMPLOYEE ACKNOWLEDGEMENT

I hereby certify that I have read and understand the safety and health guidelines contained in the ICF KE Site Safety and Health Plan for:

Project Name: ______________________

Job No._____

Employee Name: ____________________________________

Signature:______________

Date:

In case of emergency, please contact:

____
(Name)

____
(Number)

ATTACHMENT D

ICF KAISER ENGINEERS

SITE SAFETY AND HEALTH PLAN
DAILY BRIEFING

SITE SAFETY AND HEALTH PLAN
DAILY BRIEFING

Date Time	
Site Safety Officer	
Names of ICF Personnel Present	Names of Subcontractor Personnel Present
Topics Discussed	Action Necessary
Notes	

FIGURES

PARTIALLY SCANNED OVERSIZE ITEM(S)

See document # 2215622
for partially scanned image(s).

For complete hardcopy version of the oversize document
contact the Region IX Superfund Records Center